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UGANDA PROTECTORATE.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

YEAR ENDED 31ST MARCH, 1917.

Published by Command of His Excellency the Governor.

ENTEBBE:

PRINTED BY THE GOVERNMENT PRINTER, UGANDA.

1917.

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UGANDA PROTECTORATE.

DEPARTMENT OF AGRICULTURE.

		P.O. Box No.	*Telephone No.*
HEAD OFFICE	Kampala ...	53	15
VETERINARY OFFICE AND LABORATORY ...	Kampala ...	63	14
ENTOMOLOGICAL OFFICE AND LABORATORY ...	Kampala ...	5	25
BOTANICAL OFFICE AND LABORATORY ...	Kampala ...	5	26

EXPERIMENTAL PLANTATIONS:—

(1) Kampala.
(2) Kakumiro, Mubendi.
(3) Kadunguru, Bugondo.
(4) Fort Portal.
(5) Simsa, Soroti.

ANNUAL REPORT, 1916-17.

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STAFF LIST.

DIRECTOR OF AGRICULTURE:

S. SIMPSON, B.SC., (EDIN.), M.R.A.S.E., N.D.A.

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District Agricultural Officers:

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L. HEWETT, M.R.A.C. A. R. MORGAN.
T. D. MAITLAND.

Assistant District Agricultural Officer ... ... J. D. SNOWDEN.

BIOLOGICAL DIVISION.

Entomologist ... ... C. C. GOWDEY, B.SC., F.E.S., F.Z.S.
Botanist ... ... WM. SMALL, M.A., B.SC.

VETERINARY DIVISION.

Chief Veterinary Officer ... ... E. HUTCHINS, M.R.C.V.S.

Veterinary Officers:

U. F. RICHARDSON, B.SC., M.R.C.V S. W. F. POULTON, M.R.C.V.S.

Temporary Veterinary Officer ... ... R. L. L. HART, M.R.C.V.S.

Stock Inspectors:

H. L. LEMON. H. A. STRAUSS.

Indian Veterinary Assistants:

H. RAHMATULLAH. FAKHAR-UD-DIN. FAZAL-UD-DIN AHMEDI.

CLERICAL STAFF.

Clerks:

A. S. WIDGERY.

J. A. M. D'SA. J. X. DE MELLO. W. NORONHA.

ANNUAL REPORT

OF

THE DEPARTMENT OF AGRICULTURE,

UGANDA PROTECTORATE,

For the Year ended 31st March, 1917.

Staff.

Owing to vacancies, and the absence of officers on military duty, the year's work has again been undertaken with a depleted staff.

Mr. Tyrrell Bruce, Senior District Agricultural Officer, was on local military duty until he went on leave on 26th November, 1916. He has been seconded for military duty at home.

Mr. L. Hewett, District Agricultural Officer, returned from leave on 14th June, 1916.

Mr. A. R. Morgan, District Agricultural Officer, was on local military duty until the 2nd December, after which arrangements were made for him to work in conquered territory at Mwanza in connexion with the cotton crop, where he remained until the end of the year.

Mr. T. D. Maitland, District Agricultural Officer, and Mr. A. S. Widgery, Clerk, went on leave on 16th May, 1916, and returned on 17th January, 1917.

Mr. Wm. Small, Government Botanist, returned from leave on 15th April, 1916.

Mr. U. F. Richardson, Veterinary Officer, went on leave on 4th July, and was still on leave at the end of the year.

Mr. W. F. Poulton, Veterinary Officer, was on military duty until he went on leave on 26th December, 1916.

Captain R. L. L. Hart, Temporary Veterinary Officer, has been serving since September, 1914, with the East Africa Veterinary Corps, and is still away.

Stock Inspector Strauss was on military duty with the Belgian Forces until the middle of November.

Veterinary Assistant Fakhar Din was on military duty until October, when he went on leave. He returned on the 21st February, 1917.

Veterinary Assistant Fazal-ud-Din was on military duty until the 29th September, 1916.

General.

As in the previous year, conditions generally for carrying on trade and agriculture have been very trying. Produce has been delivered at the Coast more promptly, but shipping facilities have been limited.

A shortage of labour has been reported on some plantations, more particularly in Kiagwe County of the Mengo District.

Climatic conditions were favourable, except in the Eastern Province where the cotton crop suffered severely from the abnormal rains and cold weather experienced during the growing and ripening periods.

Cotton.

It has been estimated that 129,833 acres were planted with cotton, but the wet and cold weather were responsible for the yield per acre being the lowest on record, and a much larger percentage of second and third quality pickings was marketed than is usual.

The demand for the crop was decidedly keen, and high prices were realised, more particularly in the Buganda Province.

The quantities sold, as far as available figures shew, are as follows:— Lango 1,590 tons; Teso 6,658 tons; Bukedi 2,064 tons; Busoga 4,861 tons— or a total of 15,173 tons in the Eastern Province, of which 6,206 tons were delivered direct to ginneries by the growers. Kamule in Busoga was the largest market with 1,220 tons. Buganda Province sold 3,486 tons, and cotton is still coming in.

Cotton Exports.

The quantity of cotton exported was less than in the previous year being 77,961 cwts. of ginned cotton and 32 cwts. of unginned, compared with 91,231 and 8,110 cwts. respectively. Practically the whole of the cotton crop is now ginned and baled within the Protectorate. The value of the crop however was higher, being £348,914 compared with £245,426 in the previous year. 5,460 tons of cotton seed were exported as against 5,225 tons during the previous year.

Cotton Ginneries.

New cotton ginneries have been erected at Kalaki in Lango and Kidongole in Teso, whilst others are in process of construction in various parts of the country.

Quality of the Cotton.

Uganda cotton is of a high standard, when marketed in good clean condition. The highest recorded price for last season's crop was given for 16 bales grown on the Government Plantation, Kadunguru, Bugondo, which sold at 20d. per lb., or 800 points on "middling" American. 400 and 500 points on were fairly common figures.

Six samples of this season's cotton grown on the Government Plantation, Kadunguru, Bugondo, were forwarded to Messrs. Wolstenholme and Holland, Liverpool, for valuation, and they write as follows:—

"The samples are all whiter and cleaner than the usual run of "Uganda cotton and some of them have exceptionally good staple, "particularly No. 6, which, owing to its length, would sell against "Egyptian.

			Value.	Classification.
No. 1	Sunflower	No. 18.	24·75d.	Very good colour, staple 1·3/16″ to 1¼″.
No. 2	„	No. 5	25·25d.	Generally good colour, staple 1·5/16″, little mixed.
No. 3	„	No. 20	24·50d.	Good colour, staple 1·3/16″.
No. 4	Nyasaland	....	24·00d.	Good colour, staple 1⅛ to 1·3/16″.
No. 5	Sunflower	No. 14	25·00d.	Generally good colour, staple 1¼″.
No. 6	„	No. 7	28·00d.	Good colour, staple 1⅜″.

"Based on current month American Futures—July @ 17·90d.
„ „ „ Egyptian „ „ 30·50d."

Coffee.

Coffee exports have increased both in quantity and value. The figures are:— 31,136 cwts. of hulled coffee and 17,473 cwts. of coffee in parchment, with a combined export value of £113,939.

Nearly two-thirds of the coffee exports are now hulled before shipment.

The yield obtained from some estates has been rather low, as insect and fungoid pests are far too prevalent.

Rubber.

Para rubber is the crop next in importance to coffee, and larger areas are being gradually planted up. The exports last year were valued at £5,896, £40 of this being entered as forest rubber.

Cacao.

The cultivation of cacao is making some progress, and small shipments are being made regularly. The exports during the year were 257½ cwts.

Government Plantations.

Full reports on the work carried out on the various Plantations are enclosed.

Other Crops.

Interest is being taken in tea, sugar-cane, and tobacco by European planters, whilst chillies, rice, wheat, simsim, and ground nuts are being more widely planted by natives.

Live Stock.

This is a most important industry, and it is hoped in the near future to encourage systematic dipping at some centres, and also to make a small beginning with a stock farm.

Veterinary.

The report of the Chief Veterinary Officer is enclosed which gives a full account of the work done during the year.

Botanical.

The report of the Botanist is enclosed.

Entomological.

Insect attacks have again been prevalent.

The Entomologist is at present making an extended investigation on the Variegated Bug (*Antestia orbitalis*, Westw.).

The Annual Report is enclosed.

Conclusion.

The staff has worked well during the year, and to them I tender my best thanks.

Thanks are also due to the Administrative Officers, particularly in the Eastern Province, for their assistance at cotton markets.

S. SIMPSON,

Director of Agriculture,
Uganda Protectorate.

ANNUAL REPORT

ON THE

GOVERNMENT PLANTATION, KAMPALA.

———:o:———

Meteorological Records.

The distribution of the rainfall was excellent during the year under review, notwithstanding the usual dry weather of July and August. The total for the year was 52·63 inches, which is slightly above the average, *i.e.*, 51·92 inches for seven years in the comparative records as tabulated below :—

Comparative records for the last seven years :—

Month.	1910—11		1911—12		1912—13		1913—14		1914—15		1915—16		1916—17	
	No. of days.	inches	No. of days.	inches	No. of days.	inches	No. of days.	inches	No. of days.	inches	No. of days.	inches	No. of days.	inches
April ..	18	8·75	15	5·84	27	5·73	24	10·16	18	6·60	14	5·60	15	4·68
May ..	16	7·72	18	4·85	24	4·54	20	5·06	15	3·85	18	4·56	17	4·81
June ..	7	2·49	9	3·82	20	3·00	13	2·17	16	5·14	14	4·33	17	3·22
July ..	11	3·25	3	·20	15	2·65	11	2·61	12	5·43	6	·36	5	·87
August ..	7	7·71	21	5·60	18	10·39	7	·83	14	5·50	10	2·77	15	2·58
September ..	15	8·28	19	2·84	13	1·96	8	3·50	18	5·12	12	4·52	16	9·46
October ..	11	3·00	14	·79	21	6·21	20	1·78	19	5·43	14	5·23	15	4·60
November ..	15	8·25	24	8·60	23	3·07	20	3·80	26	8·00	18	6·33	12	3·13
December ..	15	4·57	10	·57	21	5·13	12	2·96	6	·55	13	3·84	10	5·42
January ..	8	1·13	11	3·12	8	2·37	9	3·63	5	·69	10	·81	13	3·54
February ..	4	·77	12	2·57	15	3·96	9	1·63	12	4·90	11	4·90	17	6·14
March ..	16	6·65	26	8·39	15	7·68	20	3·81	15	4·01	15	4·40	7	4·18
Totals ...	143	60·57	182	47·19	220	56·69	173	41·93	176	56·82	155	47·65	159	52·63

Monthly Average Temperatures, Year 1916-17.

Month	At 7 a.m.		At 2 p.m.		Maximum Temperature.	Minimum Temperature.	Highest Maximum Temperature.	Lowest Minimum Temperature.
	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.				
April	69·6	67·4	78·3	72·1	80·1	65·9	84	63
May	67·8	66·0	75·0	69·9	79·5	64·0	84	61
June	66·2	63·8	75·3	69·5	80·7	62·9	82	61
July	63·2	61·3	76·0	69·2	78·1	60·0	82	59
August	64·5	62·8	77·0	69·8	79·8	61·1	84	59
September	63·9	62·3	76·7	70·0	80·5	60·7	87	59
October	65·0	61·0	77·9	71·4	82·0	59·6	88	60
November	65·3	63·2	79·5	71·1	83·2	62·4	89	59
December	64·4	62·4	78·8	70·4	81·9	61·9	89	60
January	66·1	63·7	78·8	71·0	83·0	62·9	87	60
February	65·71	64·07	76·64	71·71	79·35	62·14	85	64
March	67·8	65·74	81·77	70·53	83·71	64·84	88	62

Labour.

No difficulty has been experienced as regards labour. An unsolicited supply varying from 100 to 120 men was maintained throughout the year, and the wages ranged from Rs. 4/- to Rs. 4/50 for unskilled and from Rs. 5/- to Rs. 5/50 for skilled labour.

Nursery.

The distribution of plants was not so great as for the previous year.

The nursery stock was largely replenished towards the end of the year.

The following is the record of plants and seeds distributed :—

	Economic Plants.	Decorative Plants.	Cacao Seed.	Tea Seed.	Para Seed.	Seeds Various.	Seeds in Packets.
						lbs.	
1st quarter ..	362	640	6,120	11,300	4,800	21	1
2nd ,, ..	270	637	4,520	2,000	2,000	50	3
3rd ,, ..	80	118	2,200	500	4,800	3	1
4th ,, ..	10	128	4,140	300	..	..	3
Totals ..	722	1,523	16,980	14,100	11,600	74	8

"Die-Back."

This disease is distributed throughout the plantation. In some parts it is more in evidence and often very severe on individual trees. It has been very evident during the last wet spell.

Primaries and twigs are often attacked at the joint, but the middles of young primaries often become infected. The part affected becomes black, and the tissue breaks down. In the early stages such primaries present a sickly appearance, the leaves at the apex hang down, wither and fall off. The primaries eventually become dried sticks. In some cases laterals grow out from one or two of the older nodes.

Even in the early stages, *i.e.*, when the green blighted leaves are still hanging, fruiting bodies of the fungus *Colletotrichum coffeanum* may be seen distributed over the diseased parts. When not visible to the naked eye they can be observed microscopically in embryo, whilst the mycelium may be traced in the tissue.

Cases where the death of the primaries is a slower process are also common. In such cases several blackened spots or patches are usually seen. The twigs generally have a sickly yellowy appearance. The mycelium in the tissue gradually ramifies the cells and the twig consequently succumbs.

The leaves have also suffered from this disease to some extent, but there is no general affection of the leaf system of the trees.

Pruning.

The procedure has consisted of handling and also of stripping the primaries in some of the plots, and the more drastic measure of stumping to 6″ of the worst trees, and the cutting off of the top portion of the tree down to the basal primaries.

Generally speaking it is difficult to adopt a hard and fast rule in pruning. Individual trees differ so much in their symmetry, and this entails individual treatment in order to restore the balance of the trees.

Handling was adopted on the normal trees, and was merely a cutting out of young twigs and laterals during the rearing of the crop. This might well be a continual process as the trees, because of our long growing season, tend to become "matted." This matting necessitates severer handling from time to time.

The primaries in plots 1, 6 and 7 were practically stripped during 1915, and they were lightly pruned again during 1916.

There is no gainsaying the beneficial results which naturally accrue, other things being equal, as the result of judicious pruning of normal trees. But we have had to deal with a large number of trees which are not normal, and no amount of pruning of the existing primaries will restore their normality and productivity.

For example, the trees in plots 1, 2 and 3 consist mainly of the well known "divided" tree, and this obtains to a greater or less degree throughout the Plantation, *i.e.*, the matted crown and base of primaries with intervening bare stem.

A comparison of the yields from plots 2 and 3 shew that the stumping of the trees in plot 2 has resulted in an increase of roughly 3 ozs. more per tree. About 50% only of the trees were stumped.

When it is borne in mind that the yields from plot 3 and from the unstumped trees in plot 2 were largely contributed to by the uppermost primaries of the crown, or, in other words, the younger growth, the results greatly favour stumping such trees with a view to getting new and definite growth from the base. This applies also to plot 1, which shews an increase of 9·15 ozs. over the previous record. This plot was manured and severely pruned during 1915, but the yields have been got more from the younger growth above 5′ of the tree than from the old primaries which we had endeavoured to rejuvenate.

Moreover flowering among the unstumped trees was very sparse, whereas the young trees resulting from the stumping produced a normal flowering, while at the same time carrying a good crop of green berries. This was a condition in keeping with the other plots. The younger coffee generally

flowered better, and so did the apical parts of the older trees as compared with the older primaries.

In some cases, where the trees have suffered less from loss of primaries and are vigorous, a sucker has been allowed to grow up from the base, the primaries of which have been cut off where it passes through the basal primaries of the parent, but allowed to develop and fill up the lost primary area, and then tapped when it reaches the crown primaries. This is quite a successful means of dealing with such trees.

In due course, however, these primaries become similarly affected, and under such circumstances the best method of dealing with the trees has been stumping.

Yields.

The yields have been for the most part good, shewing a considerable increase in most cases over previous records.

The following are the comparative yields from the various plots:—

Nyasaland Variety. 6½ years. 6-ft. × 8-ft.

No. of Plot.	Total No. of Trees.	No. of Good Trees.			No. of Indifferent Trees.			No. of Deaths.	Total Yield of Parchment Coffee.			Average Yield of Parchment Coffee per Tree.			REMARKS.
		Previous Records.		Present Record.	Previous Records.		Present Record.		Previous Records.		Present Record.	Previous Records.		Present Record.	
		1914-15.	1915-16.		1914-15.	1915-16.			1914-15.	1915-16.		1914-15.	1915-16.		
									lbs.	lbs.	lbs.	ozs.	ozs.	ozs.	
1	716	590	637	336	126	79	350	30	287½	237½	648	5·3	5·3	14·45	Manured (400 lbs. basic slag) and farmyard manure, 1913. Egyptian phosphate, 120 lbs., 1915.
2	1169	653	1147	829	533	22	331	9	108	168½	773	1·45	2·3	10·58	Unmanured. 551 trees stumped to 6″ April, 1915.
3	1386	589	1186	762	786	200	593	31	138½	269	612	1·61	3·1	7·75	Control.

In classifying the trees as good and indifferent they have been judged as such by being either normally furnished with primaries, or being largely without.

In plot 1 quite a number of the trees are on an average nine feet high, and, as already remarked, the upper portions have largely contributed to the yields.

Nyasaland Variety. 5 years. 8-ft. × 8-ft.

No. of Plot.	Total No. of Trees.	No. of Good Trees.			No. of Indifferent Trees.			No. of Deaths.	Total Yield of Parchment Coffee.			Average Yield of Parchment Coffee per Tree.			REMARKS.
		Previous Records.		Present Record.	Previous Records.		Present Record.		Previous Records.		Present Record.	Previous Records.		Present Record.	
		1914-15.	1915-16.		1914-15.	1915-16.			1914-15.	1915-16.		1914-15.	1915-16.		
									lbs.	lbs.	lbs.	ozs.	ozs.	ozs.	
4	724	737	539	Stumped to 3′ from base	Nil	185	Stumped to 3′ from base	Nil	251½	775	100	5·44	17·12	2·21	Manured with cotton seed, 1914, and liquid cow manure, 1915. Mulched with lemon grass, April, 1916.
5	305	312	203		Nil	102		7	100	196	342	5·00	10·28	17·94	Control.

All the trees in plot No. 4 were cut back to an average of three feet from the ground—to the basal primaries—during June, 1916. This was necessitated by the "die-back" from which they suffered during 1915.

The small yield is a result of this "die-back." Crop in the shape of 296 lbs. of green cherries was lost in consequence of the stumping.

The average yields from these plots for the last three years are as follows:—Plot No. 4 (Manured) 7·92 ozs., Plot No. 5 (Unmanured) 11·7 ozs., Parchment Coffee.

Nyasaland Variety. 5 years. 6-ft. × 8-ft.

No. of Plot.	Total No. of Trees.	No. of Good Trees.			No. of Indifferent Trees.			No. of Deaths.	Total Yield of Parchment Coffee.			Average Yield of Parchment Coffee per Tree.			REMARKS.
		Previous Records.		Present Record.	Previous Records.		Present Record.		Previous Records.		Present Record.	Previous Records.		Present Record.	
		1914-15.	1915-16.		1914-15.	1915-16.			1914-15.	1915-16.		1914-15.	1915-16.		
									lbs.	lbs.	lbs.	ozs.	ozs.	ozs.	
6	610	610	501	492	Nil	109	174	0	—	546	495	6·16	14·32	12·98	Manured with basic slag, 1913.
7	544	544	463	419	Nil	81	123	2	—	584	406	6·16	18·1	11·83	Control.
8	1064	1064	866	554	Nil	198	510	—	—	560½	1323	6·16	8·42	20·43	Control.
9	575	575	462	371	Nil	113	198	6	—	415	536	6·16	11·54	15·13	Mulched with lemon grass, 1915.

These plots were pruned during May and June, 1916, and resulted in the loss of some crop in plots 6 and 7.

The average yields of Parchment Coffee for the three years works out at 11·15 ozs., 12·03 ozs., and 11·67 ozs., and 10·9 ozs. for plots 6, 7, 8, and 9 respectively.

The following are the yields from the series of young plots planted in February, 1913. They suffered during their earlier growth from "Lumbugu" —couch grass—but benefitted later as the result of the deep digging in eradicating the weeds. There are no records of their yields prior to the plots being divided up as they now are.

Nyasaland Variety. 4 years. 7-ft. × 7-ft.

No. of Plot.	Total No. of Trees.	No. of Good Trees.	No. of Indifferent Trees.	No. of deaths.	Total Yield of Parchment Coffee.	Average yield of Parchment Coffee per Tree.	REMARKS.
						ozs.	
		1916-17	1916-17	—	1916-17	1916-17	
10	708	498	210	—	712	16	Unshaded.
11	719	569	150	—	550	12·23	Shaded.
12	448	335	113	—	380	13·57	Shaded. Mulched with elephant grass, July, 1915.
13	778	498	280	—	362	7·44	Shaded. Manured Egyptian phosphates, 172 lbs., July, 1915.

The shading in these plots consists of *Grevillea robusta*. They have not yet grown sufficiently to afford a complete shade, and it is therefore not a thorough test up to the present, but in any case the shaded plots as they are have suffered from *Hemileia*, "Die-back," and other pests to much the same extent as the unshaded. The *Grevillea* itself has suffered considerably from attacks of "White Ants."

Coffea Robusta.

Of the three plots of *C. robusta*, one—the Toro Variety—came into bearing during the year.

The table below gives concisely various data concerning them.

Coffea Robusta Varieties.

No. of Plot.	Origin of Plants.	Total No. of Trees.	Dates Planted.	Dates of Flowering.			Extent Affected by Diseases.		Total Weight of Parchment.	Average Yield of Parchment per Tree.	REMARKS.	
				1st.	2nd.	3rd.	*Hemileia Vastatrix.*	"Die-back"				
									lbs.	lbs.		
1	Toro	190	March, 1914.	at 2 Years	2½ Years	3 Years	Very Slight	Slight	381	2	—	Not yet providing shade.
2	Local	246	Sept. 1914.	2 Years	2½ Years	—	Severe	Slight	—	—	Planted with Shade Trees.	
3	Bwamba Forest	160	May, 1915.	1½ Years	2 Years	—	Slight	—	—	—	do	

These plots provide an interesting experiment regarding our "Uganda Coffee," especially the "Toro" and "Bwamba Forest" types.

The Toro plot shews some remarkable variations, *viz.*, broad and narrow leaved trees; some of the trees are free in growth whilst others are stumpy; and again, some have very stout primaries as opposed to the long whippy nature of others. There is still another variation in the readiness of some trees to produce laterals from their primaries. Such trees present a well nourished appearance in contrast to the scraggy nature of others. Several of these trees have been numbered with a view to raising their progeny.

As regards the "Bwamba Forest" type there are no striking variations, in fact the trees are very uniform in general habit. The basal primaries are on the whole, very long and out of proportion to the height of the tree.

The local type is more scraggy and inclined to produce suckers. In many cases the trees are two-stemmed. It has suffered from *Hemileia* from time to time, more than the others.

All the plots are carrying a good crop, especially plots 1 and 3.

None of the other coffeas, *viz.*, *C. excelsa*, *C. canephora*, *C. liberica*, etc., have yet come into bearing, and there is nothing of special interest regarding them to include in this report. (*See* Annual Report for 1915-16.)

The Bug. *Antestia orbitalis.*

The bug has gradually increased in numbers during the year, and indeed latterly they have been very numerous. They appear to be mostly associated with trees in bearing and employ themselves sucking the young berries, and flower buds if there are any about.

Coffea robusta is less subject to attack, notwithstanding the fact that they are carrying a crop of green and ripe berries.

The following gatherings are interesting:—

No. of Plot.	Type of Coffee.	No. of Trees.	Extent of Crop.	No. of Bugs.	REMARKS.
4	*C. arabica*	524	small	200	Of the 524 trees 150 have been stumped to 6". The remaining 374 were stumped to 3' and are very matted.
5	,,	305	,,	160	These trees were stumped to 3' and are very matted.
6	,,	610	,,	50	Pruned and are free in growth. All parts of trees exposed to light and air.
7	,,	544	,,	56	
1	*C. robusta*	190	heavy	2	Unpruned and natural in growth.
2	,,	240	fair	20	
3	,,	160	heavy	25	

Cacao.

The following Tables shew a considerable falling off in the yields of Cacao. This is regrettable, for the previous years saw a gradual increase. The falling off is the result not of a general unhealthy condition, but of the death of a number of trees from "Die-back," and of an unproductive condition brought about by "Canker" in others. In some cases the trees were stumped, and by this means the life of the trees was in most cases saved.

In the cases of "Die-back" due to *Lasiodiplodia theobromae* it has been healthy well-developed trees which have been lost, and this also applies on the whole to loss from "Canker." These are undoubtedly serious enemies of Cacao.

The young suckers which have grown up have in many cases suffered from fungus attack, *Colletotrichum sp.*, which causes long sunken patches, and which soon produces pink spores. In one or two of the larger woodier suckers this fungus has been observed to travel well down the stem.

"Mosquito Blight" has shewn an increase.

Cacao Yields.

7½ years. 13-ft. × 13-ft.

Theobroma Cacao Forastero.

RED VARIETY.						YELLOW VARIETY.					
No. of Tree.	Previous Records.			Present Record.	Total Yield to date.	No. of Tree.	Previous Records.			Present Record.	Total Yield to date.
	1913-14.	1914-15.	1915-16.				1913-14.	1914-15.	1915-16.		
6	27	61	17	61	166	1	12	53	44	44	153
10	8	9	16	5	38	3	28	64	91	30	210
16	8	4	26	16	54	9	19	10	39	46	114
17	19	28	46	1	94	11	8	12	20	2	42
20	13	5	27	21	66	12	4	5	18	—	27
21	11	17	25	61	114	13	8	11	22	—	41
22	11	61	37	56	165	14	8	—	—	—	8
24	9	7	58	—	74	18	2	12	25	14	53
26	6	8	4	14	32	19	4	44	36	95	179
27	4	12	52	41	109	23	3	40	122	99	264
29	11	44	97	70	222	25	9	17	57	5	88
31	9	28	46	31	114	28	4	73	110	58	245
32	2	55	95	47	199	30	9	31	13	3	56
33	3	8	3	—	14	39	1	3	61	15	80
34	7	10	24	—	41	42	2	—	1	—	3
35	8	26	22	7	63	43	2	2	3	1	8
36	11	12	28	26	137	45	8	87	114	67	276
37	4	3	26	28	61	47	4	30	17	1	52
38	7	64	30	90	191	49	6	2	51	11	70
40	1	27	33	37	98	50	4	9	36	—	49
41	11	62	—	—	73	51	1	20	21	13	55
44	2	8	11	4	25	52	11	29	34	17	91
48	7	44	53	53	157	53	14	13	77	22	126
55	1	28	84	29	142	54	3	12	34	5	54
56	4	3	10	48	65	58	6	1	41	14	62
60	4	5	32	7	48	61	4	22	44	39	109
62	2	1	78	—	81	67	11	79	27	—	117
65	4	4	—	—	8	68	10	5	84	24	123
71	5	5	74	65	151	70	6	22	11	6	45
72	8	76	54	75	213	76	16	—	49	9	74
74	15	22	67	33	137	79	3	15	19	10	47
75	24	21	53	116	208	82	46	94	57	5	182
80	12	—	—	—	12	—	—	—	—	—	—
81	14	21	9	—	44	—	—	—	—	—	—
TOTALS 34	292	789	1,297	1,094	3,416	32	276	817	1,378	655	3,011
Yearly Averages. 1913-14*	8·6	—	—	—	—	—	8·62	—	—	—	—
1914-15	—	23·2	—	—	—	—	—	25·5	—	—	—
1915-16	—	—	38·14	—	—	—	—	—	43	—	—
1916-17	—	—	—	32·17	—	—	—	—	—	20·47	—
TOTAL AVERAGES.	—	—	—	—	100·47	—	—	—	—	—	94·1

Theobroma Cacao Calabacillo.

RED VARIETY.						YELLOW VARIETY.					
No. of Tree.	Previous Records.			Present Record.	Total Yield to date.	No. of Tree.	Previous Records.			Present Record.	Total Yield to date.
	1913-14.	1914-15.	1915-16.				1913-14.	1914-15.	1915-16.		
2	34	23	15	52	124	46	12	72	67	22	173
4	21	37	29	3	90	57	2	20	57	11	80
5	32	19	8	2	61	59	30	34	17	2	83
8	2	—	—	—	2	69	1	57	71	—	129
15	18	22	2	—	42	77	1	—	—	—	1
87	43	49	80	55	227	78	7	—	2	9	18
TOTALS 6	150	150	134	112	546	6	53	183	214	44	484
Yearly Averages. 1913-14*	25	—	—	—	—	—	8·83	—	—	—	—
1914-15	—	25	—	—	—	—	—	30·5	—	—	—
1915-16	—	—	22·3	—	—	—	—	—	35·7	—	—
1916-17	—	—	—	18·66	—	—	—	—	—	7·33	—
TOTAL AVERAGES.	—	—	—	—	91	—	—	—	—	—	80·66

* Yield for 9 months only.

Age of Trees 7½ years. 13-ft. × 13-ft.

No. of Plot.		No. of Trees in Plot.	No. of Pods gathered.		Weight of Pods.		Increase in Yield of Pods.	Decrease in Yield of Pods.	Average Yield per Tree.		Remarks.
			Previous Record.	Present Record.	Previous Record.	Present Record.			Previous Record.	Present Record.	
					lbs.	lbs.					
1	Top ...	77	165	492	69	261	327	...	2·15	6·4	Shade Sparse.
	Bottom ...	86	1,056	1,791	746	1,125	735	...	12·27	20·82	do Very Light.
2	Top ...	76	514	514	272	318	...	...	6·76	6·76	do Good.
	Bottom ...	92	1,831	2,173	1,170	1,315	342	...	20·00	23·6	do do
3	Top ...	72	264	293	148	175	29	...	3·66	4·00	do Sparse.
	Bottom ...	87	1,452	927	1,037	623	...	525	16·69	10·65	do Good.
4	Top ...	51	63	245	80	116	189	...	1·4	4·8	do Very Light.
	Bottom ...	140	2,581	1,215	1,572	800	...	1,366	18·43	8·67	do Good.
5	Top ...	61	155	237	101	152	82	...	2·54	3·9	do do
	Bottom ...	126	2,656	1,987	1,505	1,224	...	669	21·00	15·76	do do

Para Rubber.

The trees continue to make good progress, and they are for the most part entirely shading the ground, so that weeding is no longer a continual process or a difficult matter.

They have been remarkably free from disease, *i.e.*, of a serious nature.

No experimental tappings were carried out during the year, except a number which have been recently commenced and which cannot consequently be included in this report.

A series of 162 trees were, however, tapped with a view to teaching new tappers. Mr. Small, who carried out the tapping, records the fact that of these 162 trees 48 yielded at a much greater rate than 93 others, whilst 21 did not yield at all.

The total yield of dry rubber was 60 lbs. 6 ozs., made up of 49 lbs. 2 ozs. biscuits and 11 lbs. 4 ozs. scrap.

The trees were tapped 128 times (daily tappings), and yielded at the rate of 5·96 ozs. per tree.

The trees are of 20·6 inches average girth, and seven years old.

Tea.

The tea continues to make good progress, and yields more or less continually.

A considerable amount of tea seed was collected and distributed.

Sugar Cane.

This crop has been taken in hand. Several of the best varieties have been introduced from India, Ceylon, and Mauritius. These were planted up in plots, some of them small, as stock plants. From these, three one-acre plots have already been laid out, including Purple tanna, Uba cane, and No. B. 3922.

Clearing.

Seven new plots have been cleared for planting up various coffeas and other crops.

Conclusion.

I was absent from the plantation from May, 1916, to February, 1917, on leave of absence, and during that period Mr. Small, the Government Botanist, had charge of the plantation.

T. D. MAITLAND,

District Agricultural Officer.

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ON THE

GOVERNMENT PLANTATION, KADUNGURU, BUGONDO.

Weather.

The following table shews the rainfall, month by month, for the year ended 31st March, 1917, and a comparison with that of previous years:—

MONTH.	1912-13		1913-14		1914-15		1915-16		1916-17	
	No. of days on which rain fell.	Rainfall in inches.	No. of days on which rain fell.	Rainfall in inches.	No. of days on which rain fell.	Rainfall in inches.	No. of days on which rain fell.	Rainfall in inches.	No. of days on which rain fell.	Rainfall in inches.
April ...	6	3·75	16	9·06	11	3·77	19	8·77	12	6·72
May ...	14	7·12	23	10·24	14	7·50	18	7·52	16	4·51
June ...	11	4·55	18	7·66	15	5·48	10	2·82	14	6·02
July ...	11	4·00	6	4·49	13	4·73	5	2·09	9	1·06
August ...	11	7·85	8	2·52	16	5·18	8	3·55	17	10·37
September ...	11	3·26	4	·91	14	7·95	18	5·49	15	7·71
October ...	10	3·17	14	6·11	20	5·85	14	4·43	11	4·98
November ...	9	3·31	12	3·99	21	11·70	14	9·36	11	7·04
December ...	2	·58	4	1·88	3	·36	12	3·51	6	3·14
January ...	*Nil*	*Nil*	4	2·20	*Nil*	*Nil*	4	·83	10	3·32
February	7	3·95	5	1·37	*Nil*	*Nil*	11	2·25	11	3·47
March ...	9	4·17	10	3·53	9	6·02	10	3·31	3	1·45
Totals ...	99	45·71	124	51·96	136	58·54	143	53·83	135	59·79

Mean Temperatures for the Year 1916-17.

MONTH.	Maximum.	Minimum.	Highest recorded Temperature.	Lowest recorded Temperature.
April	83·5	67·4	89	65
May	82·1	66·6	86	64
June	80·0	65·1	84	62
July	79·8	64·4	83	60
August	80·1	64·9	85	61
September	80·16	65·2	84	62
October	83·2	65·5	86	62
November	86·3	63·8	92	60
December	87·2	63·6	91	61
January	89·3	62·6	95	59
February	87·4	63·2	99	61
March	92·7	65·6	98	61

The weather of the past year was remarkable for the high total rainfall, the absence of any distinct dry season, and the low temperatures recorded throughout the year.

The above conditions were common to the whole of the Teso and Lango Districts, and the cotton season was by far the worst on record.

In August and September there was much flooding of the low-lying areas, and consequent destruction of crop.

Insect attacks were also more prevalent. The damage done by "boll-worm" and "stainer" was very considerable, resulting in a low yield of cotton.

Change of Site.

Early in the year it was decided to remove the head-quarters of the Agricultural Officer from Kadunguru to Soroti, as being a more central position for the supervision of the Teso and Lango Districts.

The work on the Kadunguru Plantation was left in the care of a native overseer, with monthly visits of inspection by the writer.

A site was chosen for a new plantation near to Soroti, and it is intended gradually to transfer the work of seed selection from Kadunguru to the new site, which has been called Simsa Plantation.

Work was started at Simsa on 1st October, 1916, and a short report on this is given on a separate paper.

Cotton Seed Selection and Propagation.

(*a*) *General Distribution.*—For the first time the whole of the cotton area in the Protectorate was sown with seed derived from selections made at Kadunguru Plantation.

The seed was of the Sunflower variety, and was obtained from the restricted seed area of Serere County, having been propagated from selections made on the Plantation in 1912.

On account of the adverse weather conditions the crop was not a successful one in many parts of the country, and, as a consequence, there was a large percentage of stained and immature fibre. Where the crop was successful, however, there was a distinct improvement in the quality of the cotton—the staple was more regular, and the lint was finer, stronger, and had a better twist than that of previous years.

(*b*) *Ginning Out-turn.*—The ginning out-turn appears to vary in different parts of the country. From tests made in the office with 21 samples from the markets and ginneries in the Teso and Lango Districts the percentage is seen to vary from 25·5% to 32·8%, with an average for the 21 samples of 30·52%. The method of procedure followed in testing was to weigh 100 seeds of seed cotton, gin it by hand, and then weigh the lint and seed separately—two tests being made with each sample.

(*c*) *Main Cotton Crop.*—The main cotton crop of the Plantation consisted of a few of the best selections of the previous year. In common with the general crop of the district, the Plantation crop suffered severely from the excessively wet and cold season.

The crop planted well and had a most promising appearance up to the end of December, and some excellent cotton was picked early in January. At the middle of January heavy rains commenced, and continued for a month, from which the crop did not recover. An attack of boll-worm ensued, and on 1st March it was seen that the crop would be a failure—90% of the bolls being diseased, and spoiled by the weather.

The following table summarises the results:—

Selection No.	Area in Acres.	Yield.		Total.	Average Yield per acre.	Ginning Out-turn.	REMARKS.
		A. Quality.	B. Quality.				
		lbs.	lbs.	lbs.	lbs.		
Sunflower 5 ...	7	1,255	700	1,955	265	29·74	To be retained.
18 ...	5	758	500	1,258	251	29·5	do
14 ...	12	1,637	1,135	2,772	231	27·52	To be discarded.
20 ...	10	1,396	964	2,360	236	30·27	To be retained.
7 ...	4	608	341	949	237	29·35	do
Allen 25 ...	2	184	120	304	152	29·53	do
4 ...	2	125	130	255	127	28·32	To be discarded.
Nyasaland ...	12	2,041	1,161	3,202	267	31·05	To be retained.
Individual Selection ...	6	520	330	850	142	—	—
Totals ...	60	8,524	5,381	13,905	232	—	—

The yields are seen to be exceedingly low and the very high proportion of B. quality cotton is an indication of the general diseased condition of the crop. The earliness or lateness of the crop made no difference, the whole crop being affected alike.

(*d*) *Selection Experiment Plots.*—An examination of the selection experiment plots was carried out in the month of December, and, as usual, the best plots were selected for further propagation on the Plantation. Many of the selected plots had subsequently to be discarded owing to the prevalence of insect attack and disease on the boll.

Out of 32 plots 11 were retained for further experiment, particulars of which are given in the following table:—

Variety.	No. of Plot.	Average length of staple.	Strength.	Regularity.	Per-centage of lint.	Trans-mission.	Remarks.
		inches.					
Sunflower	1 (14)	$1\frac{3}{8}$	Strong ...	V. Regular...	28·1	V. Good...	An excellent sample of cotton but rather low ginning out-turn.
do	12 (20)	$1\frac{1}{4}$	V. Strong ...	do ...	31	do	A fair sample of medium length. Seed small and well covered.
do	13 (18)	$1\frac{1}{4}$	Strong ...	Regular ...	30·8	Good ...	A fair sample of medium length.
do	14 (18)	$1\frac{5}{16}$	V. Strong ...	do ...	30·5	V. Good...	An excellent sample of good length. Seed small and well covered.
do	16 (18)	$1\frac{3}{8}$	F. Strong ...	F. Regular...	30·1	F. Good...	A fair sample. Not too strong and somewhat irregular.
do	23 (7)	$1\frac{3}{8}$	V. Strong ...	V. Regular...	29·8	Good ...	An excellent sample. Very strong and regular.
do	24 (8)	$1\frac{3}{8}$	Strong ...	Regular ...	29·5	Good ...	A fair sample free from stain.
Allen ...	28 (25)	$1\frac{3}{8}$	V. Strong ...	V. Regular...	28·7	V. Good	These Allen selections are distinctly superior to any of the others.
do ...	29 (25)	$1\frac{1}{4}$	do	do	30·1	do	
Nyasaland	30	$1\frac{3}{16}$	do	do	31·5	do	These selections, although short stapled, are a distinct improvement on the general crop of Nyasaland cotton.
do	32	$1\frac{3}{16}$	do	do	32	do	

The numbers in brackets refer to the original selections.

It was my intention to cross-fertilise the Nyasaland short staple with some of the longer stapled selections, but the character of the season precluded the possibility of a successful result, and the idea was abandoned until next season.

(*e*) *Individual Selections.*—Individual selections were made on the foregoing experiment plots. In all 40 plants were selected for propagation. These plants, at the date of selection, were in excellent condition and free from disease. Subsequently 20 of the selections had to be abandoned on account of insect attack, and of the remainder only 12 were found to be suitable for propagation.

On the table at the end of this Report the results of the examination into these selections are summarised.

In these samples the length and strength of the staple is all that can be desired, but the ginning out-turn in some of them is somewhat low.

After testing numerous pure samples it is seen that uniformity of the staple and the distribution of the lint on the seed are the main factors affecting the ginning out-turn, that the size and heaviness of the seed has little or no effect on the proportion of lint to seed—in fact in many cases the heaviest seed gave the highest ginning percentage, and that it is directly affected by climatic conditions and the healthiness of the crop.

The importance of maintaining as high a ginning out-turn as possible in Uganda cotton is recognised, and steps are being taken to improve the cotton in that respect.

Other Crops.

Small areas of Ground Nuts (native), Maize (Hickory King), Gram, Soya Bean, and "Dhal" (*Cajanus indicus*) were grown for distribution among the natives. The latter was found to be useful as a windbreak among the cotton. Planted in belts of about 20 feet wide in April, it attained a height of 10 feet in October, and gave useful shelter to the cotton crop from the Autumn storms.

Other crops experimented with were imported Ground Nuts (three kinds—Spanish, Ceylon, and Japanese), Millet (*Eleusine coracana*), Rice (Indian and Nigerian). These were sown in small plots, and gave successful results. The seed has been kept for more extensive sowing next season.

Coffee.

The small area of coffee now four years old was heavily infested by leaf disease (*Hemileia vastatrix*), and "Die-back" was also prevalent. The plants were well pruned, and the crop recovered towards the end of the year, but a very small yield of berry was obtained.

Rice.

There was some extension with this crop among the natives of the Teso District, and most of the chiefs put down a plot of Rice. These plots were on the whole well laid down and attended to, and where the drainage of the soil had been carefully carried out successful results were obtained. The sites chosen for the plots were mostly on the edge of marshes which, with the very wet season and absence of proper drainage, became water-logged and incapable of producing a successful crop.

Two new varieties of Rice (Nigerian and Indian) were experimented with, and both were successful. The Nigerian is very prolific and produces a heavy crop. The seed of both varieties has been distributed among the chiefs in Teso District.

R. G. HARPER,
District Agricultural Officer.

Report on the Examination of Individual Plant Selections.

Variety of Cotton.	No. of Plant.	No. of bolls per plant actually picked.	Average length of staple.	Regularity.	Strength.	Silkiness.	Per-centage of Lint.	Weight of 100 Seeds.	REMARKS.
			inches.					grams.	
Sunflower ...	$1\frac{14}{1}$	40	$1\frac{3}{8}$	Regular ...	V. Strong ...	V. Silky ...	27·3	196	A very nice sample of good length and strength, but slightly irregular.
do ...	$2\frac{18}{16}$	20	$1\frac{1}{2}$	V. Regular	Strong ...	do ...	31·3	175	An excellent sample. Seed well covered.
do ...	$3\frac{7}{23}$	24	$1\frac{1}{4}$	do ...	V. Strong ...	Silky ...	28·5	186	A nice sample free from stain. Seed rather large and heavy.
do ...	$5\frac{7}{23}$	35	$1\frac{3}{8}$	do ...	do ...	do ...	27·5	187	A nice sample free from stain. Seed well covered but rather large.
do ...	$6\frac{18}{14}$	23	$1\frac{5}{16}$	do ...	do ...	V. Silky ...	30·4	175	An excellent sample free from stain. Seed well covered.
Allen ...	$7\frac{25}{27}$	27	$1\frac{1}{4}$	Regular ...	Strong ...	do ...	28·5	180	A very fair sample.
do ...	$8\frac{25}{28}$	20	$1\frac{1}{2}$	V. Regular	V. Strong ...	do ...	30·0	165	An excellent sample free from stain. Seed well covered.
do ...	$9\frac{25}{29}$	20	$1\frac{5}{16}$	do ...	do ...	do ...	29·16	172	A nice sample. Very strong. Seed well covered.
Nyasaland ...	10 (30)	24	$1\frac{5}{16}$	do ...	do ...	Silky ...	30·0	197	An excellent sample. Lint well distributed on seed. Seed large and heavy.
do ...	11 (32)	26	$1\frac{3}{16}$	do ...	do ...	F. Silky ...	31·6		Excellent samples of medium length. Very strong. Seed very large but well covered.
do ...	12 (32)	22	$1\frac{3}{16}$	do ...	do ...	do ...	31·3	208	

NOTE :—Column III. of the above shews the number of healthy bolls. All the selected plants had a number of diseased bolls.

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GOVERNMENT PLANTATION, KAKUMIRO, MUBENDI.

———:o:———

Throughout the year this Plantation has been in charge of a native overseer, with very occasional visits by Officers of the Department.

The area under cultivation is approximately 35 acres, which includes the oldest *Coffea arabica* in the country, as well as some of the oldest *Hevea braziliensis*, and these facts make the Plantation of some interest and importance.

Rainfall.

The rainfall for the year was above the average, and no period of drought was experienced. The records for the last four years are given in the table below:—

MONTH.	1913-14		1914-15		1915-16		1916-17	
	No. of days on which rain fell.	Rainfall in inches	No. of days on which rain fell.	Rainfall in inches.	No. of days on which rain fell.	Rainfall in inches.	No. of days on which rain fell.	Rainfall in inches.
APRIL	20	7·16	16	5·18	15	7·39	17	6·77
MAY	11	2·12	8	2·86	11	3·48	15	6·13
JUNE	*No record*		10	3·50	7	1·63	5	2·03
JULY	8	1·29	9	3·07	5	3·22	8	3·92
AUGUST	9	2·48	10	4·95	7	4·62	12	4·67
SEPTEMBER	9	4·37	17	6·74	14	4·40	19	10·91
OCTOBER	15	6·49	20	8·16	12	8·09	14	7·00
NOVEMBER	13	3·13	21	8·71	15	5·22	13	3·44
DECEMBER	2	0·14	5	1·11	9	2·59	9	2·97
JANUARY	7	1·97	2	0·12	2	0·32	7	2·54
FEBRUARY	5	0·77	7	1·46	16	5·95	11	6·22
MARCH	12	6·09	12	4·38	9	3·91	8	1·90
TOTALS ...	111	36·01	137	50·24	122	50·82	138	58·50

Coffee.

The total area under this crop is 21·81 acres, and the total yield for the year was 5,702 lbs. of Parchment only, or an average of 280 lbs. per acre. Particulars of the yields from the various plots for the past four years are given below:—

Year planted.	Area in acres.	Average yield of "Parchment" per acre in lbs.			
		1913-14.	1914-15.	1915-16.	1916-17.
1904	3·68	1,034	233	711	369
1906	2·11	438	130	261	159
1907	1·90	1,274	347	818	322
1910	1·95	1,712	638	1,297	393
1911	2·99	107	200	283	207
1912	1·21	123	880	642	363
1913	7·97	—	99	430	193

All the above coffee is *Coffea arabica* introduced originally from Nyasaland.

The plots are clean weeded, and diseases and insect pests are not much in evidence, so that a fair average crop is expected next year.

Coffea stenophylla has proved a failure, whilst little promise is shewn by the *Coffea arabica, var. Costa Rica.* A plot of native coffee *(Coffea robusta)* promises well.

The establishing of good shade trees amongst the coffee appears difficult, and on the whole their growth is very indifferent.

Of the *Erythrinas*, *Umbrosa* is fairly promising, but appears to be rather brittle and easily broken off. *E. velutina* is valueless, whilst the majority of the *E. indica* get damaged by insects when very small, and are useless. *Grevillea robusta* will probably prove to be the most useful shade tree.

Rubber.

Three kinds of rubber are cultivated, *viz.*, Para, Funtumia, and Ceara.

The two former were planted in 1906, but were neglected for some years, and progress was retarded through the troublesome weed "lumbugu" taking complete hold of the rubber areas.

However the weed is being gradually eradicated, and improved growth is resulting therefrom. Some measurements taken of the Para shew a steady increase of girth, and there are now quite a number of trees over 30 inches at three feet from the ground—the largest being 35·5 inches. The bark renewal from previous tappings is satisfactory.

Out of 367 Para trees nine were broken off in a gale during the year, and five were attacked by "die-back." The latter were uprooted and burnt.

Four groups of trees were tapped for six consecutive months (May to October) during the year, but it is unfortunate that these experiments had of necessity to be left to the native overseer.

The results are given below:—

Group 1.

45 Trees. 10 years old. Average girth 24¾ inches. 3 Cuts. Half Herring Bone. Daily except Sundays.

MONTH.	Rainfall.		No. of times tapped.	Biscuit.	Scrap.	Total Dry Rubber.	Average per tree.	Average per tapping.	Number not yielding.
	Days.	Inches.		ozs.	ozs.	ozs.	ozs.	ozs.	
May ...	15	6·13	27	304	68½	372½	8·2	·30	Nil
June ...	5	2·03	26	109½	62	171½	3·8	·14	Nil
July ...	8	3·92	26	60	17½	77½	1·7	·06	Nil
August ...	12	4·67	*27*	*61*	*38½*	*99½*	*2·2*	*·08*	*7*
September	19	10·91	*26*	*69½*	*20½*	*90*	*2·0*	*·07*	*39*
October ...	14	7·00	*These figures not calculated in totals.*						
Totals ...	73	34·66	79	473½	148	621½	13·8	·17	...

After four months tapping 15·5% dry.
„ five „ „ 86·6% „
Scrap Rubber ... ... 23·8%.

Group 2.

69 Trees. 10 years old. Average girth 25 inches. 3 Cuts. Half Herring Bone. Alternate days except Sundays.

MONTH.	No. of times tapped.	Biscuit.	Scrap.	Total Dry Rubber.	Average per tree.	Average per tapping.	Number not yielding.
		ozs.	ozs.	ozs.	ozs.	ozs.	
May	14	240	50½	290½	4·2	·30	Nil
June	13	110	48	158	2·2	·16	Nil
July	13	77½	41½	119	1·7	·13	Nil
August	14	95	56½	151½	2·1	·15	Nil
September ...	13	113	23½	136½	1·9	·14	19
October	14	82½	22	104½	1·5	·10	21
Totals ...	81	718	242	960	13·9	·16	...

After five months tapping 27·5% dry.
Scrap rubber ... ... 25%.

Group 3.

53 Trees. 10 years old. Average girth 25 inches. 3 Cuts. Half Herring Bone. Every third day except Sundays.

MONTH.	No. of times tapped.	Biscuit. ozs.	Scrap. ozs.	Total Dry Rubber. ozs.	Average per tree. ozs.	Average per tapping. ozs.	Number not yielding.
MAY	11	192	25½	217½	4·1	·37	Nil
JUNE	10	89½	43	132½	2·5	·25	Nil
JULY	10	74½	46	120½	2·2	·22	Nil
AUGUST	10	83	38½	121½	2·2	·22	Nil
SEPTEMBER ...	10	83	23	106	2·0	·20	4
OCTOBER	11	157½	38	195½	3·6	·32	4
TOTALS ...	62	679½	214	893½	16·8	·26	...

After five months tapping 7·7% dry.
Scrap rubber ... ... 23·9%.

Group 4.

51 Trees. 10 years old. Average girth 23 inches. 3 Cuts. Half Herring Bone. Every fourth day except Sundays.

MONTH.	No. of times tapped.	Biscuit. ozs.	Scrap. ozs	Total Dry Rubber. ozs.	Average per tree. ozs.	Average per tapping. ozs.	Number not yielding.
MAY	8	112	26	138	2·7	·33	Nil
JUNE	7	63	30½	93½	1·8	·25	Nil
JULY	8	28½	36½	65	1·2	·15	Nil
AUGUST	8	...	...	78	1·5	·18	Nil
SEPTEMBER ...	7	...	...	83	1·6	·22	5
OCTOBER	8	...	...	127	2·4	·30	5
TOTALS ...	46	...	...	584½	11·4	·24	...

After five months tapping 9·8% dry.

In judging the above results, it must be borne in mind that this rubber is not in the real Para area of the country, and also that the tapping is very poor, as the cuts only average eight to the inch. There is no reason why 12, 15 or even more cuts per inch should not be performed by the local tappers.

The period over which the experiments were carried out is not long enough to make useful deductions, and the groups can hardly be correlated.

Some comparison however can be made by taking Group 1 (daily tappings), for three months only which compares with Group 2 (alternate days) for six months with 81 tappings and, nearly, with Group 3 (every third day) with 62.

Tappings at longer intervals than every third day are of academic interest only.

Daily tapping on this system is far too severe, and in this case resulted in 86·6% of the trees being dry after five months.

The tables shew that the Group 3 system, every third day, was the best of the series, and it is quite likely that this period may be the most suitable in the end, but further experiments are necessary.

The Funtumia and Ceara were not tapped during the year.

Tea.

The small plot of tea has made good growth, giving every promise of success, and the area will be extended gradually.

A little leaf has been plucked, but these plants will be established as seed bearers.

Cacao.

The cacao plot has made little progress during the year and no improvement can be hoped for in its present position.

A more sheltered position, with deeper soil, is necessary before any hope of success can be expected.

Native Silkworm Trees.

(*Bridelia micrantha var. ferruginea*).

These trees have made good growth, and the area is becoming naturally stocked with the African Silkworm.

The Mubendi District in the past produced most of the silk exported, and, when a market is once more available for this product, it will be a simple matter to encourage natives to undertake production in their own gardens.

Cotton.

Three acres were planted with cotton in September.

Owing to lateness in sowing, and the abnormally wet season, the yield was very low, and the percentage of second quality cotton was very high.

The following are details:—

Variety.	Area.	Crop.		Total lbs.
		First quality.	Second quality.	
Uganda ...	2 acres	203	100	303
Nyasaland...	1 acre	120	102	222

Wheat.

In this District wheat cultivation is being introduced on a high plateau, and promises well. Half an acre was planted here but yielded 94 lbs. only. More success was obtained by planting three small packets of Pusa wheats—Nos. 4, 6 and 12—obtained from Dr. Howard. All yielded well, thus giving ample seed for further trials.

Bulo (Small Millet).

Half an acre was planted from introduced seed, and gave the extremely heavy yield of 660 lbs., or at a rate of half a ton per acre.

Miscellaneous Crops.

Small areas of maize, sim-sim, buckwheat, and rice were grown.

Rice, however, was not a success, but its cultivation will be carried on in the hope of establishing an extra food crop in the District.

Fruit.

All kinds of fruits grow well here, and a well stocked orchard has been established, consisting of limes, lemons, oranges, mangoes, figs, grape-vines, pawpaws, mulberries, pine-apples, avocado pears, etc.

All are doing well, but few have as yet reached the bearing stage.

Cover Crops.

It is time that some serious attempt was made to tackle the question of green manuring and cover cropping. With wide planted crops, on sloping land, without sufficient drainage, the wastage of surface soil is tremendous.

Seven plots were sown with various cover crops. *Cassia hirsuta* and *Tephrosia candida* both made very strong growth. *Crotalaria striata* and *Tephrosia vogelii* made very good growth. The *Indigofera hirsuta* made very fine growth, covering the ground well, whilst the *Crotalaria juncea* made fine slender growth.

Either *Tephrosia vogelii* or *T. candida* would make excellent cover crops in this district.

S. SIMPSON,
Director of Agriculture.

ANNUAL REPORT

ON

THE EXPERIMENTAL STATION, FORT PORTAL, TORO.

———:o:———

This is situated on the main Kampala—Fort Portal Road, five miles from Fort Portal, at an altitude of over 5,000 feet.

Little progress has been made during the year, and the supervision has been done entirely by the District Commissioner.

Only five acres are under cultivation.

Coffee.

This is the main crop and the trees have made excellent growth. Picking will soon be taking place, and it will be interesting to compare the yields in this district with those obtained in other parts of the Protectorate. Insect and other pests have not been found to any great extent, but the fact must not be overlooked that the plantation is both very small and young.

Tea.

The small number of tea plants surviving promise well, but a large proportion were killed off in the early stages. An effort will be made to extend this area at an early date.

Rubber.

The Para plants remaining made very slow growth, but this crop is not expected to thrive in that region.

Other Crops.

Japanese buckwheat did well, and native beans, but, until more adequate supervision can be given departmentally, progressive work can hardly be expected.

S. SIMPSON,
Director of Agriculture.

ANNUAL REPORT

ON

THE GOVERNMENT PLANTATION, SIMSA, SOROTI.

———:o:———

A site for the new plantation was chosen about three miles from the township of Soroti, and within one mile from the Rappayi Ginnery of the Bombay Uganda Syndicate, Ltd.

It is intended to take in altogether an area of 100 acres, about 60 of which will be devoted to cotton seed selection and propagation, and the remainder to experiments with special crops and suitable rotations for improving the fertility of the soil which is of a light sandy loam, easy to work and very suitable for the use of agricultural implements.

The work of preliminary clearing was started on 1st October.

Several nurseries of shade trees, including *Grevillea robusta*, *Prosopis juliflora*, several species of Eucalyptus, Ensambya, etc., were sown, and these have planted well.

The draught oxen and ploughs were removed from Kadunguru to Simsa, and a large area has been ploughed and prepared for next season's cotton crop.

A portion of the marsh adjoining the Rappayi River was drained and cultivated, and an experiment with the Rice crop is being carried out there.

The surrounding country is very suitable for cattle, and there is an abundant and never failing water supply.

A Stock Farm might be run in conjunction with this plantation with beneficial results both to the stock of the district and to the plantation, the soil of which might be fertilised by top-dressings of rich composts made from farmyard manure and cotton seed.

R. G. HARPER,
District Agricultural Officer.

ANNUAL REPORT

OF

THE CHIEF VETERINARY OFFICER.

———:o:———

Staff.

During the year the Veterinary Staff available for civil duty was one Veterinary Officer for the first three months, one Stock Inspector throughout the year and two after Mr. Strauss' return in November; and, since October, two Veterinary Assistants.

Diseases of Cattle.

Rinderpest.

Buganda Province.

Rinderpest first appeared in the Mengo District in Kiagwe in August, 1913. In 1914 it appeared in Bugerere and in 1915 it extended to Bulemezi, Buruli, Kiadondo and Busiro.

Since March, 1916, there have been no outbreaks of rinderpest amongst cattle or game in the Province which is now at last free from this disease.

The epidemic was kept under control by the quarantine regulations, which were, on the whole, well observed, and it was finally eradicated by the double inoculation of the greater proportion of all cattle in the infected areas, and also of those in the clean areas adjoining the infected.

During the three years in which the epidemic was prevalent in the district 23,000 cattle were immunised, being from one-half to two-thirds of the total estimated number of cattle in the infected areas. The number of uninoculated cattle which died during this period is estimated at 12,000.

Eastern Province.

In the Eastern Province there have been numerous outbreaks of rinderpest in Busoga, in Budiope, at Jinja and also at Busia, in Eastern Teso, and in many parts of the Bukedi District. Except in Budiope the losses were mainly amongst young cattle. The disease appears to have now died out in Lango but it is endemic in the Bukedi District. In February the inoculations were re-commenced at Mbale and 157 transport cattle were immunised.

Northern Province.

In the Northern Province outbreaks of rinderpest were reported in the Gulu and Chua Districts. No outbreaks have occurred in Bunyoro or in the West Nile Districts.

Western Province.

Rinderpest has never spread into the Western Province, which contains about 350,000 cattle. The disease is widely prevalent in the territory to the South of the Uganda Protectorate.

Trypanosomiasis.

Losses from trypanosomiasis were not so serious amongst native herds in the Buganda and Western Provinces as in previous years. Only one outbreak was reported in the Mengo District, in Northern Singo.

A large proportion of the Military Transport cattle working on the Bukakata—Mbarara road became infected and some transport teams owned by Indian traders also suffered heavily. There are no tsetse on this road but it is possible that some of the oxen became infected near Bukakata where Glossina Palpalis is found on the lake shore.

A number of the Government Transport oxen died from this disease on the Fort Portal—Mubendi road. There are no tsetse on this road. The source of infection was probably some transport cattle sent from Kampala to Matiri, the Transport Depôt at Mile 161. The trypanosome (*T. Pecorum*) would appear to have been transmitted at Matiri by *Tabanidae* and *Haematopota* which were exceptionally numerous there during the rainy season.

In Kampala nine of the Municipal oxen became infected with *T. Pecorum*. These were isolated and treated by intravenous injections of antimony potassium tartrate. Three (Nos. 2, 3 & 6) have recovered, their blood is not now infective for dogs and their general condition is good. Three others though still infected are improving in condition.

Four (Nos. 8, 9, 10 and 11) out of five which became infected with *T. Pecorum* in February, 1916, and received the same treatment recovered, and have been working regularly since May, 1916. The results from this line of treatment are the most promising of any yet obtained here and further experiments are being carried out this year.

In 1914-1915 28 of the Municipal oxen died from trypanosomiasis. In 1915-16 eight died and in 1916-17 two died. A microscopic examination of the Municipal oxen is now made weekly.

Losses amongst cattle from trypanosomiasis, which became infected in areas in which no tsetse exist, have in past years been very heavy in Buganda. This is the most serious veterinary problem with which we have to deal. It is the greatest obstacle to the development of cattle transport in the Buganda and Western Provinces.

The primary source of infection is the tsetse in the fly areas. Cattle, having become infected there, and subsequently being brought into contact with healthy herds in fly-free areas, have caused extremely heavy losses both amongst native herds and transport oxen.

Many such outbreaks amongst cattle have occurred in areas in which tsetse have never been found, and in which the other domesticated animals do not become infected.

In these cases the infection appears to be transmitted with most certainty by Tabanidae where these are present in any numbers. In some outbreaks stomoxys, and possibly haematopota, appear to have been the transmitting agents.

Hitherto it has not been possible effectively to control the movement of cattle out of or through areas in which tsetse exist, but as these areas become better known and more accurately defined it should be possible, by the control of stock routes, to avoid the passage of cattle through fly areas and thus to bring about a very material reduction in the danger of infection from this source.

East Coast Fever.

This disease is endemic over the whole of the Buganda Province. In the Eastern Province it is not endemic in the Bugishu counties on the foot-hills of Mount Elgon nor in the north-eastern part of the Teso District. More work requires to be done in mapping out the non-endemic areas in the Eastern Province and in testing the immunity of cattle from outlying and more recently administered parts of the Province.

Money has been sanctioned for the construction of a cattle dip in Kampala during this year.

The grazing in and around Kampala is very heavily tick-infested, and it is hoped that when the regular dipping of cattle has been established, together with the eradication of ticks, a reduction in the number of biting flies which molest the cattle may also be effected by this means.

In the Mubendi District a number of water buck died in November and December. When the first reports of game dying were received it was thought possible that rinderpest might have spread eastward from the Congo. Investigations made in January shewed that deaths were due to an extraordinary heavy infestation by brown ticks. Filaria were found on examination of blood slides obtained from water buck.

Foot and Mouth Disease.

Foot and Mouth Disease has been more than usually prevalent during the past year, particularly in Ankole and Toro.

At Mbarara there was an outbreak of a severely malignant form amongst the Military Transport and Supply cattle and a high percentage of the infected died. There were outbreaks of a very mild type in Kampala during February and March. No cases have as yet been seen in any animals except cattle.

Diseases of Goats and Sheep.

Contagious pleuro pneumonia of goats was responsible for the deaths of a very large number of goats obtained from Ankole and Toro for the supplies of the Military forces on the Southern Frontier.

In Karamoja, where the natives possess large flocks of sheep and goats, very heavy losses were reported during the exceptionally wet season in that district.

Goat scab has been prevalent in the Teso and Bukedi districts and has caused very considerable mortality.

Diseases of Equines.

Ulcerative Lymphangitis.

Eight cases amongst mules were reported. Lymphangitis was very prevalent amongst the Military mules on the Southern Frontier but most of these were kept going under treatment.

Trypanosomiasis.

Six deaths occurred in mules on the Southern Frontier from this disease.

Diseases of Dogs.

37 cases of Piroplasmosis were treated in Kampala. Almost all of these recovered. One dog brought from Masindi to Kampala was found to be infected with T. Brucci and died on arrival here.

Exportation of Cattle.

In July the East Africa Quarantine Regulations were modified so as to allow cattle from Uganda to be imported, if inoculated here with anti-rinderpest serum prior to removal.

1,158 cattle were exported from the Eastern and 1,462 from the Buganda Province.

During recent years there has been a very considerable development of bullock transport in the Eastern Province, particularly in the Teso district where the chiefs are also now going in very largely for ploughing for cotton cultivation. The demands for bullocks in the Province are therefore increasing, and it is improbable that there will be any increase in the number of cattle sold in the Eastern Province for export to East Africa for some years to come.

Legislation.

A new draft Diseases of Animals Ordinance was published in the *Official Gazette* for November. This Ordinance was drafted on the Diseases of Animals Ordinance now in force in British East Africa and the rules made thereunder.

Powers have been reserved under the new Ordinance for controlling traffic and movement of animals through tsetse fly areas and for compulsory dipping.

A draft Branding of Stock Ordinance was also published. This Ordinance should go a long way towards checking the many thefts and frauds which are extensively practiced by the Bahima herdsmen, particularly in the Buganda Province.

Kampala Slaughter House Returns.

From 1st April, 1916, to 31st March, 1917.

MONTHS.	Animals Examined.			Condemnations.	
	Cattle.	Sheep.	Goats.	Carcases.	Parts.
April	71	75	157	2	35
May	60	82	255	2	25
June	56	49	209	...	24
July	55	55	268	4	26
August	57	58	265	5	26
September	56	33	311	6	26
October	44	20	152	5	19
November	42	22	96	2	22
December	47	19	221	3	29
January	64	31	264	8	36
February	29	31	110	7	23
March	53	27	301	2	63
Totals ...	634	502	2,609	46	354

Summary of Slides Examined, Kampala.

Cattle.

Trypanosomes	...156
Filaria	... 1
Anaplasma	... 2
Ringworm	... 6
Blue Bodies	... 30
Negative	2,561

Dogs.

Piroplasma ...	... 34
Filaria	... 14
Trypanosomes and Piroplasma	4
Trypanosomes and Filaria	... 2
Negative ...	... 202

Miscellaneous.

Mules, Trypanosomes	4
„ Ulcerative Lymphangitis	14
„ Negative ...	4
Kob, Filaria ..	2
Donkeys, Trypanosomes ...	8
„ Negative... ...	13
Fowls, Bacteria	3
„ Negative	1
Water Buck, Negative ...	2

Cases Treated at the Veterinary Dispensary.

Cattle ...	...420
Mules ...	... 15
Donkeys ...	... 2
Mules for Lymphangitis	2
Pony for Lymphangitis	1
Dogs ...	...165
Cats	... 4
Elephant ...	... 1
Parrot	... 1
Monkey ...	... 1
Antelope ...	... 1

Deaths of Government Live Stock.

Deaths reported amongst Government Live Stock in various districts are shewn in the schedule attached.

General.

Rinderpest, which for the past seven years has taxed all the energies of the Veterinary Staff, has at last been brought under control to the extent that the only areas where it exists to-day are in the remote districts bordering the Sudan and British East Africa, and thus all danger of the epidemic extending through Uganda into Southern Africa has for the time being been removed.

We are therefore at last in a position to turn our attention to the other and now no less urgent problems affecting the live stock industry of Uganda. Amongst these are the prevention and cure of trypanosomiasis, the accurate mapping of the distribution of East Coast Fever and eventually its eradication, Foot and Mouth Disease, the diseases of sheep and goats and those other problems which occupy the time of Veterinarians in countries in which these formidable animal plagues are happily unknown.

I have to thank the Staff of the division, Veterinary Officers, Stock Inspectors and Veterinary Assistants for their good work during the year and the Administrative Officers for their assistance in issuing the permits under the quarantine regulations for the movement of cattle in their districts.

E. HUTCHINS,
Chief Veterinary Officer.

Schedule showing Deaths reported amongst Government Live Stock during 1916-1917.

Names of Places and Districts.	Species of Animals.					Rinderpest.	Trypanosomiasis.	Debility.	Gall Sickness.	Anthrax.	Abortion.	East Coast Fever.	Lymphangitis.	Anaemia.	Old Age.	Destroyed by order of C.V.O.	Cause of death not known.
	Bullocks.	Cows.	Calves.	Donkeys.	Mules.												
Kampala	67	....	....	....	....	2	45	4	....	1	....	....	....	....	2	1	12
,, ...	....	....	....	....	3	....	....	....	....	....	....	....	1	....	2	....	...
Entebbe	9	....	....	....	....	2	....	1	....	1	....	....	....	....	1	....	4
,, ...	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
,, ...	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Soroti	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....
,, ...	....	....	....	2	....	....	....	....	..	....	1	....	1	....	....	....	....
Kampala-Bombo Road	2	....	....	....	....	....	....	..	....	....	...	....	....	....	....	....	2
Kampala-Entebbe Road	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Kampala-Matiri Road	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6
Matiri	93	....	....	....	....	....	76	....	....	....	....	....	....	....	....	....	17
Kitgum	....	....	1	....	....	...	....	....	....	....	....	....	....	....	....	....	1
Gulu	....	2	8	....	....	....	....	....	....	....	....	....	....	....	....	....	10
Butiaba	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Toro	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....
Totals	181	3	10	2	3	4	122	5	1	2	1	1	2	1	5	1	54

ANNUAL REPORT

OF

THE GOVERNMENT ENTOMOLOGIST.

Biological Laboratory, Kampala, Uganda,
28th April, 1917.

Sir,

I have the honour to submit my Annual Report for the year ending March 31st, 1917.

The months of February and March were almost entirely spent on non-entomological duties.

Twenty-eight visits were made to European estates during the year.

Brief accounts of the insect pests of the year are given below under the crops on which they occur.

Insect Pests of Coffee.

1. Scale Insects (*Coccidae*).

The list of scale insects occurring on coffee is further augmented by the addition of six species. The species now known to attack this crop are :—

a. *Icerya nigroareolata*, Newst.
b. *Asterolecanium coffeae*, Newst.
c. *Pseudococcus citri*, Risso.
d. *Pseudococcus virgatus*, Ckll.
e. *Pulvinaria psidii*, Mask.
f. *Ceroplastes ceriferus*, And.
g. *Ceroplastes galeatus*, Newst.
h. *Ceroplastes vinsonioides*, Newst.
i. *Coccus africanum*, Newst.
j. *Coccus viridis*, Green.
k. *Saissetia hemisphaerica*, Targ.
l. *Saissetia nigra*, Nietn.
m. *Saissetia subhemisphaerica*, Newst.
n. *Stictococcus gowdeyi*, Newst.
o. *Selanaspidus articulatus*, Morg.
p. *Ischnaspis longirostris*, Sign.

a. *Icerya nigroareolata*, Newst.

This species is rarely met with on coffee, but it is very frequently found on crotons.

b. *Asterolecanium coffeae*, Newst.

This scale is readily recognized by its golden colour and is easily separable from the only other representative of this genus, *A. bambusae*, known to occur in this country.

**c.* *Pseudococcus citri*, Risso.

This species is to be found almost throughout the tropics and is undoubtedly the most injurious member of the genus. The tendency of the larvæ and adults to assemble in large clusters on the fruit and flowers is characteristic of this insect and, as a consequence, it sometimes happens that

* Vide Ann. Rept., Dept. Agric., 1916-17, p. 49.

the flowers and newly set fruit drop. Often, too, the young shoots are completely killed. The more usual injury, though, is to the foliage and to the roots, and on the latter owing to the inaccessibility of the roots it is the more difficult to deal with.

The eggs are laid on the fruit, twigs, under the loose bark on the stem, and roots. They are enclosed in light cottony material in clusters varying from 300 to 500 in number. The period of incubation is about eight days. The newly hatched larvæ are light yellow in colour and at first are devoid of any waxy covering, and hence it is at this stage that remedial measures would be the most effective. The larvæ moult three times, about fifteen days elapsing between each moult. Egg-laying begins about ten days after the final moult—that is, after the adult stage is reached—and death soon follows oviposition.

Table I—Showing Length of Periods of Metamorphic Stages.

	Date of					
Eggs deposited.	Emergence of larvæ.	First moult.	Second moult.	Third moult.	Egg laying.	Death of females.
July 4	July 13	July 28	Aug. 11	Aug. 26	Sept. 5	Sept. 8
Aug. 10	Aug. 18	Sept. 2	Sept. 16	Oct. 1	Oct. 11	Oct. 13
Sept. 7	Sept. 15	Oct. 1	Oct. 16	Nov. 1	Nov. 10	Nov. 12
Sept. 29	Oct. 7	Oct. 23	Nov. 7	Nov. 21	Dec. 2	Dec. 4
Average number of days of several stages	8·25	15·5	14·25	15·0	10·0	2·25

d. Pseudococcus virgatus, Ckll.

This species secretes considerably more wax than the preceding species; it has two long white filaments at the anal extremity and numerous long waxy filaments radiating from all parts of the body, which in the later stages become matted. It restricts its attacks to the foliage and green twigs.

e. Pulvinaria psidii, Mask.

The eggs and young larvae are green; the adults are also green, but they are concealed by a white cottony substance. It is always accompanied by the non-parasitic, soot-like fungus, *Capnodium brasiliense*, which lives on the exudations of the insect.

j. Coccus viridis, Green.

This insect is highly parasitised by a small wasp *(Chalcididae)*, which assisted by the Coccinellid beetles, *Chilocorus discoideus* and *C. punctata*, has been the cause of making it unnecessary to resort to remedial measures on several estates.

2. Leaf-Eating Caterpillars.

a. Parasa sp. (?)

The eggs of this moth are flat and scale-like, laid in overlapping rows. The larvæ are slug-like, having a segmented body bearing irritant spinous tubercles. Pupation takes place in a hard oval cocoon, which opens at one end for the emergence of the adult. The pupal period is very long. The moth is medium sized, having the forewings green and edged with brown, the hindwings brown, the body green, except the apical third of the abdomen, which is brown.

This insect occurs in so few numbers and so rarely that it has not yet been necessary to resort to remedial measures.

I have bred several specimens of the cuckoo wasps, *Chrysis (Tetrachrysis) lyncea*, Fab., and *C. postscutellaris*, Mocs., from the cocoons of this moth.

b. Metadrepena glauca, Hmp.

No outbreak of this caterpillar was reported during the year. In view of the serious outbreaks last year east of the Nile, this is rather pleasing.

3. Cutworms.

Agrotis spp.

No damage by cutworms was reported, but evidence of their activity was observed on some of the estates visited.

4. Coffee Leaf Miner.

Leucoptera (Cemiostoma) coffeella, Staint.

This insect first appeared as a pest on coffee in this country in July and up to the present it is confined to Singo District. On one estate in particular in that district it has proved itself to be a serious pest.

The eggs are deposited on the leaves, the incubation period being about five days. The largest number of eggs revealed by abdominal dissections is twelve. The larva varies from yellowish to flesh colour; it is divided into eleven segments, those near the head being somewhat enlarged: length 4 to 5 mm. The larvæ penetrate into the leaves and feed on the parenchyma, resulting in large brown patches caused by the drying of the upper epidermis; before this occurs the galleries are traceable. The larvæ are habitually segregate, but one leaf may contain—and often does—more than one distinct mine. After a certain period, varying from twelve to sixteen days, the full grown larva leaves the leaf through an aperture most often on the underside of the leaf, about 1 mm. in diameter. The larva then constructs on either side of the leaf in less than twenty-four hours two thick, white, short braids of silk crossed obliquely. Between this web and the leaf the larva transforms into a white, spindle-shaped pupa. The chrysalis may be formed on either side of the same leaf in which the larva mined, but it frequently occurs that the larva drops to another leaf by means of a thread of silk. The insect remains in the pupal stage for about eight days. The moth is white in colour and is covered with silvery scales; expanse of wings 5 to 6 mm.

Leaves which are badly mined have a scorched appearance and eventually drop. Even when they do not drop so much of the epidermal tissue is destroyed that the functions of the leaf are interfered with.

This pest lends itself to no other control measure than the collection of the infected leaves, those that have fallen as well as those still remaining on the trees.

5. Coffee Berry Borer.

Stephanoderes coffeae, Haged.

This beetle is as in late years ubiquitous, but there has been marked diminution on some of the estates that were badly infested the preceding year.

6. Stem Borers.

Nitocris princeps, Jord.
Apate indistincta, Murr.
Apate monacha, Fab.

Only a few reports were received of the presence of the above; but in the case of the first, at any rate, it is more prevalent than one would be led to conclude from the paucity of the reports, the reason being that the treatment is so well circulated that it is applied without reference to me.

7. Aphids.

Toxoptera coffeae, Nietn.

Specimens of the above have been frequently observed on coffee in the nurseries and young plants in the fields. The treatment is Whale Oil Soap, 1-lb. to seven gallons of water.

8. Other Plant Bugs.

Antestia orbitalis, var. *faceta*, Germ.
Lycidocorus mimeticus, R. & P.

As anticipated in my report for last year, *A. variegata* has proved to be a serious pest on this crop. The investigation of this bug has been taken in hand and until the completion of the investigation I must hold over further comments.

Lycidocorus mimeticus has appeared very recently on one estate. Nothing is yet known of the habits of this bug, except that it attacks the very young leaves, causing the destruction of the tissue in more or less rectangular patches.

Insect Pests of Cacao.

The insects reported during the year as attacking this crop were :—

The Cacao Girdler	....	*Sthenias cylindrator*, Fab.
Shot Hole Borers	....	*Xyleborus* spp.
The Cacao Beetle	....	*Adoretus hirtellus*, Castn.
Leaf Eating Caterpillars		a Saturniid, *Parasa* sp. (3)
Fruit Fly	....	*Ceratitis punctata*, Wied.
Bug	....	*Plataspis vermicellaris*, Stal.
Mosquito Blight	....	*Helopeltis bergrothii*, Reut., var.
Aphis	....	*Toxoptera theobromae*, Schout.
Scale Insects	....	*Stictococcus diversiseta*, Silv.
		Pseudococcus sp. (?)
		Pseudococcus citri, Risso.
		Inglisia castilloae, var., *theobromae* Newst.

A comparison of this list with that given on pp. 51, 52 of the Annual Report of the Department of Agriculture for 1915-1916, will show that the only two new pests here recorded on this crop are the scale insects, *Pseudococcus* sp. (?) and *Inglisia castilloae*, var., *theobromae*.

The former attacks the pods and the leaves ; the latter attacks the pods, flower clusters, and the young twigs. Both can be controlled by spraying with kerosene emulsion.

Insect Pests of Tea.

The only insects which are yet known to attack this crop, which is only being tried on a few estates, are the scale insects, *Aspidiotus transparens*, Green, on the leaves, and *Coccus discrepans*, Green, on the roots and the Mosquito Blight, *Helopeltis bergrothii*, Reut., var.

The female puparia of *A. transparens*, are usually to be found on the undersides of the older leaves. They are flat and circular in outline, white in colour, with pale yellow, central, transparent pellicles.

Helopeltis attacks the young leaves and tender shoots. The appearance of a tree recently attacked is normal, but the leaves and shoots are spotted with brown discolorations, which may coalesce. In the case of old attacks the leaves have fallen off and the shoots are dry, and when the drying up of the shoots continues the tips of the branches have a "witch broom" appearance, and growth comes to a standstill.

Insect Pests of Cotton.

The cotton stainers, both *Dysdercus* spp. and *Oxycaraenus* spp., were as usual very abundant, but the bollworm, *Earias insulana*, was considerably less than during the early months of 1916. A careful search was made for the Pink Bollworm, but its presence has not been detected.

The Leaf-footed Plant Bug, *Leptoglossus membranaceus*, F., was not observed in the Busoga District on tours made in that District in April, 1916, and February, 1917.

Insect Pests of Rubber.

The bourbon scale insect, *Aspidiotus destructor*, Sign., was observed to seriously attack Ceara and Para rubbers and resulted in several cases in the death of the former.

Another scale insect, *Icerya sulphurea*, Lind., not hitherto recorded from this country, is found in large quantities on Castilloa rubber. The other food plants of this scale insect are guava and the ornamental shrub, *Eranthemum bicolor*.

Pests of Fruit Trees.

On Orange: the Citrus Psylla, *Trioza* sp. (?), the plant louse, *Aphis citri*, Ashm., the Orange Butterfly, *Papilio demodocus*, Esp., the Fruit Fly, *Ceratitis capitata*, Wied., and the scale insects, *Lepidosaphes gloverii*, Pack., *L. citricola*, Pack., and *Selanaspidus silvaticus*, Lind. The last is new to our fauna.

On Pineapple: the scale insect, *Pseudococcus bromeliae*, Bouché.

On Mango: the Fruit Fly, *Ceratitis punctata*, Wied., the scale insects, *Icerya seychellarum*, Westw., *Pseudaonidia trilobitiformis*, Green, and *Aspidiotus destructor*, Sign.

On Custard Apple: the Variegated Bug, *Antestia orbitalis*, var. *faceta*, Germ., the scale insects, *Tachardia decorella*, Mask. and *T. longisetosa*, Newst. (lac-producing scales), *Stictococcus diversiseta*, Silv., *Ceroplastes quadrilineatus*, Newst. and *C. ceriferus*, And.

On Guava: the scale insects, *Icerya sulphurea*, Lind., *Tachardia decorella*, Mask., *Inglisia conchiformis*, Newst., *Ceroplastes singularis*, Newst., *Coccus setigerum*, Newst. (sp. nov.) *C. signatum*, Newst. (sp. nov.), *Aspidiotus cydoniae*, Comst., and *A. destructor*, Sign.

On Banana: the scale insects, *Aspidiotus cyanophylli*, Sign., and *A. destructor*, Sign.

Pests of the Shade Tree, *Gliricidia maculata.*

The scale insects, *Pseudococcus citri*, Risso, and *Coccus longulus*, Dougl., and the Aphid, *Toxoptera coffeae*, Nietn., seriously attack this shade tree. It will be observed that the first mentioned insect also attacks coffee and cacao, and the last coffee.

Locusts.

Six swarms of locusts were reported during the year:—On the road between Kiganuna and Kakumiro proceeding in the direction of Kaganwa; on the Kampala—Mubendi road, mile 54 to 57, travelling in a North-Westerly direction; at Kireka; at Katale; on the Kampala—Entebbe road, mile 7 to 8; and on the Mubendi—Fort Portal road, Mile 120.

The Collection.

The addition of a large number of species of insects was made to the collection during the year. The following arthropods were donated to the Imperial Bureau of Entomology:—

Ixodidae	74
Thysanoptera, spp.	5
Chyrsopina	1
Orthoptera	71
Aphidae, spp.	8
Coccidae, spp.	8
Rhynchota, Other	517
Diptera	30
Coleoptera	864
Lepidoptera	31
Hymenoptera	489
TOTAL ...	2,098

Parasites and Predators.

Considerable attention was paid to the rearing of parasitic and predacious insects, resulting in the discovery of a large number of these beneficial insects, many of which are new to science.

A list of some of the species is given below :—

Host.	Parasite.	Predator.
Tachardia decorella, Mask ...	*Coccophagus nigropleurum, Gir.	
,, ,, ,, ...	*Aenasiella africa, Gir.	
,, ,, ,, ...	Stratmopoda osteëtis, Meyr.	
Pulvinaria jacksoni, Newst ...	*Tetrastichus gowdeyi, Craw.	
Ceroplastes galeatus, Newst ...	*Neomphaloidella ceroplastae, Gir.	
,, ,, ,, ...	*Eurytoma galeati, Gir.	
,, ,, ,, ...	Scutellista cyanea, Mosch	
Inglisia conchiformis, Newst...	Eublemma scitula, Ramb.	
Coccus viridis, Green ...	... ...	Chilocorus discoideus.
,, ,, ,, ...	... ...	Chilocorus punctata.
,, ,, ,, ...	Chalcidid No. 3139	
Saissetia nigra, Nietn. ...	,, No. 3915	
Saissetia oleae, Bern. ...	Coccophagus saintebeauvei, Gir.	
Stictococcus diversiseta, Silv...	Eublemma costimacula, Saalm.	
,, ,, ,, ...	Chalcidid No. 4371	
Stictococcus gowdeyi, Newst...	*Coccophagus comperei, Gir.	
,, ,, ,, ...	*Epitetrastichus ugandensis, Gir.	
Aspidiotus destructor, Sign. ...	... ...	Chilocorus discoideus.
Aphis gossypii, Glover ...	... ...	Epilachna punctipennis, Muls.
Antestia *orbitalis*, var. *faceta*, Germ. ...	Chalcidid No. 1022	
Nitocris princeps, Jord ...	Braconid No. 3939	
Conchyloctaenia punctata, F., parummaculata, Boh...	*Tetrastichus ovivorum, Craw.	
Acrea vinidea, Hew. ...	Tachinid No. 5700	
Neptis agatha, Cram. ...	*Tetrastichus sculpturatus, Waters	
Precis terea, Dru. ...	Braconid No. 5840	
Belenois subidua ...	Proctotrypid No. 5858	
,, ,, ...	,, No. 6134	
Papilio demodocus, Esp. ...	Braconid No. 5848	
Metadrepena glauca, Hmp. ...	Chalcidid No. 1080	
Redoa luteipes, Walk. ...	Tachinid No. 5598	
Gonobonyx angulata, Auriv. ...	,, No. 5856	
Deilmera apicalis ...	Braconid No. 5849	
Caviria maria, Kirby ...	Tachinid No. 682	
Parasa sp. (?)	... ...	Chrysis lyncea, Fab.
,, ...	... ...	Chrysis postscutellaris, Mosch.
Dasychira crenulata, B.-B. ...	Braconid No. 5841	
,, ,, ...	Phorinia verritus, Walk.	
Acherontia atropos, L. ...	Tachinid No. 6805	
Hypsoides milleti, de J. ...	Chalcidid No. 3166	
Lechriolepis heres, Schaus. ...	Tachinid No. 3213	
Anaphe infracta, Wlsm. ...	,, No. 2317	
,, ,, ...	*Bothria sp. (?)	
,, ,, ...	Cryptus formosus, Brulle	
,, ,, ...	*Apanteles africanus, Vier	
,, ,, ...	*Telenomus gowdeyi, Craw.	

* sp. nov.

Plant Imports.

One hundred and eighty-three consignments of plants and seeds were inspected during the year.

I have the honour to be,
Sir,
Your obedient servant,

C. C. GOWDEY,
Government Entomologist.

DIRECTOR OF AGRICULTURE,
KAMPALA.

ANNUAL REPORT

OF

THE GOVERNMENT BOTANIST.

———:o:———

The Botanical work of the Department has been in my charge since my return from leave at the end of April, 1916. From then until 31st January, 1917, I was also in charge of the Government Plantation, Kampala, a circumstance which interfered greatly with laboratory work.

A tour of Kiagwe plantations was undertaken in December, 1916, and in February and March, 1917, I travelled through Bulemezi and Buruli to Masindi and Hoima. After visits to the estates in these districts, I returned to Kampala by Mityana.

I have been indebted to Mr. Dümmer and to Mr. Petch, of Ceylon, for herbarium specimens and to the Director, Royal Botanic Gardens, Kew, for the identification of much material.

The following paragraphs contain an account of the various cases of plant disease which have occurred during the period under review. The fungoid pests are mentioned under the headings of the different hosts.

Coffee.

Cercospora coffeicola, B. & C., causing a leaf and berry blotch, has not been much in evidence. It is, like *Hemileia*, always to be found on coffee estates. Several cases of damage to trees from hail-storms have been under notice. Small open cankers are produced in the twigs, and the leaves are usually torn irregularly. Among the small fungi found in the dead tissue of the cankers were a *Phomopsis* sp., a *Rhabdospora* (? *R. Coffeae*, Del.) a *Phoma*, sp. (probably undescribed), and an immature Ascomycete which may be the *Anthostomella coffeae* recorded by Delacroix on dried coffee branches from Mexico. On the torn leaves was a *Septoria* which has been described as *S. coffeae*, Wakefield sp. nov. These small fungi are most likely all saprophytic.

Hemileia vastatrix, B. and Br., has been found during the year on plants of *Coffea liberica* from West Africa, and *Coffea excelsa* grown from seed supplied by Dr. Cramer, Java. On the *Coffea arabica* of Uganda cultivation it is always present in varying quantity, but it can be asserted with safety that its effects are not of the same disastrous nature as have been attributed to it in other parts. It is, in my opinion, of far greater importance and of more effect to prevent the weakening and frequent deaths of trees which follow overbearing, especially at the time of the first bumper crop than to combat directly *Hemileia* leaf disease. In other words, die-back is more to be feared then *Hemileia*. By die-back, I mean the barren condition of coffee trees described fully in my Annual Report for 1914-15. Should heavy bearing be accompanied by an attack of *Hemileia*, as it was on the older coffee estates of Uganda, the results are apt to be little short of disastrous.

Colletotrichum coffeanum, Noack, described originally on Brazil coffee, occurs on die-back branches, but on by no means all of them, and to it cannot be attributed the die-back that occurs on such a large scale. Noack himself remarked that the *Colletotrichum* did not appear to do much damage, and that, when branches with *Colletotrichum* died, the trees were suffering in other ways, *e.g.*, from too heavy a crop. Such trees would probably have died back in any case. I am convinced that the case of Uganda is similar to this, though the point will be cleared up definitely only by a series of infection experiments.

Hymenochæte noxia, Berk. (Brown Root Disease) has not been in evidence during the year. Its place has been taken by a root disease which will be referred to as Black Root Disease on account of the black rhizomorphs by which it is characterised. The same disease has occurred on cacao, tea, Hevea, Ceara, indigenous trees, and guava (?). No fructifications of the fungus having been obtained, identification of the disease is as yet impossible. The fungus is, in all likelihood, one of the *Agaricaceae*, a group which includes many dangerous parasites of trees. The rhizomorphs were actually found in one case passing over from dead Ceara roots to the adjacent roots of a tea plant which was also killed.

The first case of nematode (eel-worm) root-infection of coffee occurred during the year on seedlings in beds. The nematode has not been identified.

Broken and imperfect coffee beans, characterised by the adhering of small flakes of "silver skin" to the cotyledons and by the presence of small cankers, show on the diseased parts numerous pycnidia of a *Phoma* which is also found on coffee twigs. It is remarkable that such broken beans are usually enclosed in a sound skin, and it is concluded in the meantime that the *Phoma* is introduced into the berry by the agency of some biting insect, probably by a plant bug. Such berries when dried often develop numerous sporodochia of a *Fusarium* which is distinct from *P. coffeicola*, B. Henn.

Cacao.

Diseases of this crop have been more frequent than in previous years. This was anticipated in my Report for 1914-15, and a warning was given at that time. The most harmful of Uganda cacao diseases is die-back due to *Lasiodiplodia theobromæ*, G. and M. (*Thyridaria tarda*, Bancroft). The same fungus has been found during the year on dead castor oil stems lying in a cacao plot, on *Leucaena glauca* and on *Albizzia moluccana*. The two last were being grown as cacao and coffee shade respectively. *Phyllosticta ramicola*, Petch, and *Periconia pycnospora*, Fres., also occurred on the Albizzia. The two shade trees had died back on planting out, and the presence of the *Lasiodiplodia* in them only shows how ready the fungus is to take advantage of its opportunities. Similarly, *Diplodia* spores are commonly found on the surface of healthy cacao leaves and twigs. The microconidia of a *Fusarium* (pink) are often found on the smallest twigs of branches killed by die-back. *Colletotrichum theobromicolum*, Del., occurs on both branches and pods, though much more frequently on the latter than on the former. On branches it is harmful inasmuch as it ensures the entrance to the attacked part of the die-back fungus, and on pods because it causes a destructive hardening. The soft black or brown rot of cacao pods seems to be due to the die-back fungus alone *(Lasiodiplodia theobromæ)*, for several examples during the year have yielded no other fungus. *C. theobromicolum* is probably the same species as *C. incarnatum*, Zimm., previously recorded on cacao pods in Uganda.

A cracked condition of cacao stems accompanied by a reddish discoloration of the wood has been partially investigated during 1916. A *Fusarium*, cream-coloured in the mass, a grey mycelium, *Nectria diversispora*, Betch, *Calonectria cremea*, Zimm, and a *Verticillium* have been isolated from diseased tissue, but lack of time and material has prevented my undertaking inoculation experiments in order to decide which of these fungi, if any, is the prime cause of the disease.

The Black Root Disease of cacao has already been mentioned. A new root trouble has appeared during the year. The affected trees were young, under two years from seed, and were growing in a heavy moist soil. The tap-roots of all were covered externally with strands of *Helicobasidium* mycelium, and the tissues external to the wood were disintegrated. Internally, mycelium was present in the vessels and elements of the medullary rays. This species of *Helicobasidium* is new and has been named by Miss Wakefield, Kew, as *H. longisporum*. The sporophores develop at the surface of the ground and envelop the stem of the attacked plant. I am inclined to regard this fungus as parasitic. A similar mycelium was found in 1914 on the roots of young Hevea trees, but has not been encountered since on the same host.

A *Phyllosticta* and an immature Ascomycete have been found on cacao leaves which have up till now been free of fungoid disease.

Hevea.

Para die-back, due to *Lasiodiplodia theobromæ*, G. and M., (*Thyridaria tarda*, Bancroft) has been fairly common during 1916. The fungus usually found on the exterior of affected branches is *Glœosporium alborubrum*, Petch. An example of a canker which is characterised by a large open wound, which exposes the wood and never heals up although it appears to be doing so, has been met with. A minute fungus has been found in the bark during the youngest stage of this canker, and to it may be ascribed the cause of the disease. It is referred to meantime as a *Coniothyrium*; examples obtained up to date have been immature.

The Black Root Disease of Hevea has been referred to under "Coffee." No *Hymenochæte* disease has occurred in 1916; *Fomes lignosus*, Kl., *Sphærostilbe repens*, B. and Br., and *Ustulina zonata* (Lev.), Sacc. have not been found on Para. In fact, the first two root parasites named have not yet been recorded in Uganda, and the last, *Ustulina zonata*, has been found only on stumps of indigenous trees in a district well removed from that in which Hevea is planted in quantity.

No *Phytophthora* canker has been noted, and affections of the tapped surface of Hevea are negligible at present.

Other Crops.

The Black Root Disease of Coffee, Cacao, and Hevea occurs also on tea, guava (?) and Ceara. The sooty mould of coffee (*Capnodium brasiliense*, Putt.) has been found on cacao and *Gliricidia maculata* leaves. *Crotalaria juncea* and *C. striata* were defoliated in August, 1916, by a *Sclerotinia* of bananas due to *Glœosporium musarum*, Cke. and Mass., which is common in certain districts, and *Puccinia pruni*, Pers., causes damage to peach leaves. An unidentified fungus occurs on cardamons, and *Hemileia scholzii*, (P. Henn.), Syd., and *Meliola clerodendricola*, P. Henn., are found on the leaves of a native clerodendron grown in gardens. Garden roses are attacked by *Sphaerotheca pannosa*, Lev, (oidium only) and *Actinonema rosae*, (Lib.), Fr. A *Colletotrichum* and *Botryodiplodia theobromae*, Pat., (*Lasiodiplodia* form) have been recorded on the fruits of a palm (Raphia ?). Cotton areolate mildew (*Ramularia areola*, Atk.) and boll anthracnose (*Colletotrichum gossypii*, Sth.) have been common. The ascigerous stage of the latter *Glomerella gossypii* (Sth., Edg.) is also common. A second cotton leaf fungus is probably *Cercospora gossypina*, Cke.

Conclusion.

Uganda is still in a favourable position as regards the frequency of and harm caused by plant diseases, but it is not to be expected that this state of affairs will continue for an indefinite period. It will not always be difficult to get sufficient material for working purposes.

The problems requiring more attention than it has been possible to devote to them are those of the rot and hardening of cacao pods, cacao stem canker, sterility in cacao flowers, coffee die-back, coffee broken beans and cacao and Hevea die-back.

W. SMALL,

Government Botanist.

APPENDICES.

Estimated Number of Live-Stock in the Protectorate.

Province and District.	Horses.	Mules.	Donkeys.	Cattle.	Sheep.	Goats.
BUGANDA :—						
Mengo	—	*	4	49,034	8,497	102,605
Entebbe	1	*	7	2,589	1,499	15,875
Masaka	—	2	4	52,977	1,840	10,123
Mubendi	—	1	1	8,000	4,100	24,100
TOTAL ...	1	3	16	112,600	15,936	152,703
EASTERN :—						
Busoga	—	2	1	39,500	18,000	45,000
Bukedi	1	8	20	*	*	*
Teso	—	1	40	157,687	40,830	87,896
Lango	—	2	10	24,000	70,000	150,000
Karamojo, Lobor ...	No basis for an estimate.					
TOTAL ...	1	13	71	221,187	128,830	282,896
NORTHERN :—						
Masindi	—	2	3	2,203	2,647	11,428
Hoima	—	—	3	4,736	2,329	9,315
Gulu	—	1	17	*	*	*
Chua	—	6	100	9,000	7,000	30,000
West Nile ..	—	4	3	50,000	40,000	80,000
TOTAL ...	—	13	126	65,939	51,976	130,743
WESTERN :—						
Toro	—	3	11	52,595	15,687	37,962
Ankole	—	1	6	230,000	50,000	250,000
Kigezi	—	*	*	*	*	*
TOTAL ...	—	4	17	282,595	65,687	287,962
RUDOLF :—						
Turkwel, Turkana, Dabossa ..	No basis for an estimate, but the number known to be very great.					
GRAND TOTAL ...	2	33	230	682,321	262,429	854,304

* Number not known.

Native Agriculture.

ACRES.

Province and District.	Beans.	Chillies.	Cacao.	Coffee.	Cotton.	Cassava.	Indian Corn.	Millets.		Wheat.	Plantains.	Dhal.	Rubbers.		Rice.	Sim-Sim.	Sugar Cane.	Ground-nuts.	Potatoes.		Linseed.	Tobacco.	Onions.	Castor Oil Plants.	Vegetables
								Matama.	Wimbi.				Para.	Other.					Sweet.	English.					
BUGANDA :—																									
Mengo ..	300	25	15	3,000	20,000	100	200	150	150	..	390,000	20	1,000	1,000	30	4,500	150	1,750	180,000	25	..	30	*	..	*
Entebbe ..	312	10	6	2,532	2,475	2,285	240	8	5	..	29,031	11	159	48	30	155	1,312	112	2,372	50	..	12	*	..	*
Masaka ..	355	10	..	1,928	5,020	*	2,197	*	1,405	2	*	430	..	..	..	3,503	*	2,391	6,615	289	..	*	*	..	*
Mubendi ..	6,000	20	..	300	3,900	45	450	500	7,000	5	11,500	200	..	50	10	1,400	50	150	13,500	20	..	2,000	*	..	*
TOTAL ..	6,967	65	21	7,760	31,395	2,430	3,087	658	8,560	7	430,531	661	1,159	1,098	70	9,563	1,512	4,403	202,487	384	..	2,042	..	..	..
EASTERN :—																									
Busoga ..	75	*	..	25	19,842	..	*	*	*	..	*	*	..	..	47	*	*	*	*	*	..	*	*	..	*
Bukedi ..	*	*	..	65	15,580	*	*	*	*	..	*	*	..	3	85	*	*	*	*	16	4½	*	*	.	*
Teso ..	25,000	..	..	10	51,000	3,000	2,000	30,000	50,000	..	7,000	*	..	50	80	3,000	*	20,000	20,000	..	..	*	*	..	*
Lango ..	*	..	..	..	11,039	*	*	*	*	..	*	*	..	..	*	130,000	*	*	*	*	..	*	*	..	*
Karamojo } ..																									
Lobor }											NO BASIS FOR AN ESTIMATE.														
TOTAL ..	25,075	..	..	100	97,461	3,000	2,000	30,000	50,000	..	7,000	..	..	53	212	133,000	..	20,000	20,000	16	4½	..	..	..	..
NORTHERN :—																									
Masindi ..	1,900	50	417	1,908	600	*	1,000	100	6,000	3	4,000	1,000	50	..	20	2,000	*	100	15,000	5	..	10	*	..	*
Hoima ..	1,170	7	110	405	195	10	530	390	3,800	..	1,700	890	2	10	3	580	10	30	3,600	5	..	20	*	10	20
Gulu ..	*	*	..	5	..	..	*	*	*	..	*	*	..	..	1	*	*	*	*	..	..	*	*	..	*
Chua ..	*	*	..	..	30	*	*	*	*	..	*	*	..	..	*	*	*	*	*	*	..	*	*	..	*
West Nile ..	*	..	..	..	..	*	*	*	*	..	*	..	..	..	..	*	*	*	*	*	..	*	*	..	*
TOTAL ..	3,070	57	527	2,318	825	10	1,530	490	9,800	3	5,700	1,890	52	10	24	2,580	10	130	18,600	10	..	30	..	10	20
WESTERN :—																									
Toro ..	20,000	..	..	70	2	500	1,000	1,000	30,000	800	12,000	2,000	..	..	10	1,000	100	800	10,000	3	..	5	5	..	*
Ankole ..	10,500	..	..	170	150	100	525	3,000	10,000	10	15,000	10,000	..	5	..	100	15	500	21,000	10	..	300	10	..	*
Kigezi ..	40,000	..	..	2	..	..	3,000	21,000	21,000	45	2,700	85,000	..	..	..	..	..	..	7,000	40	..	200	*	..	*
TOTAL ..	70,500	..	..	242	152	600	4,525	25,000	61,000	855	29,700	97,000	..	5	10	1,100	115	1,300	38,000	53	..	505	15	..	..
RUDOLF :—																									
Turkwel } ..																									
Turkana }											NO BASIS FOR AN ESTIMATE.														
Dabossa }																									
GRAND TOTAL ..	105,612	122	548	10,420	129,833	6,040	11,142	56,148	129,360	865	472,931	99,551	1,211	1,166	316	146,243	1,937	25,833	279,087	463	4½	2,577	15	10	20

* Acreage not known.

European Agriculture.

Compiled from Returns of 128 Plantations.

Province and District.	Number of Estates.	Total Acreage taken up.	Total Acreage under Cultivation.	Total Acreage not Cultivated.	Acreage of Coffee (*Arabica*).		Acreage of Coffee (*Robusta*).		Acreage of Coffee and Para.		Acreage of Para.		Acreage of other Rubbers.		Acreage of Cacao		Acreage ready for Cacao.	Indian Corn.	Chillies.	Ground Nuts.	Cotton.	Various Economic Crops.
					Under 2 years.	Over 2 years.	Under 2 years.	Over 2 years.	Under 2 years.	Over 2 years.	Under 5 years.	Over 5 years.	Under 5 years.	Over 5 years.	Under 5 years.	Over 5 years.						
BUGANDA :—																						
Mengo ...	55	30,153	10,945	18,197	287	3,287	20	110	* 273	2,648	82	1,041	...	766	*1,844	213	63	...	...	...	...	130
Entebbe ...	7	2,278	1,221	1,037	11	230	...	1	120	350	35	3	...	...	465	35	...	...	...	...	...	2
Masaka ..	14	6,901	1,580	4,957	53	1,020	40	21	91	108	...	...	...	...	180	...	...	...	...	...	...	67
Mubendi ...	5	2,100	694	1,322	40	637	...	...	...	...	...	4	...	1	21	...	...	...	...	...	...	6
TOTAL ...	81	41,432	14,440	25,513	391	5,174	60	132	484	3,106	117	1,048	...	767	2,510	248	63	...	...	...	...	205
EASTERN :—																						
Busoga ...	7	6,475	1,247	5,053	265	391	5	26	...	278	...	...	...	...	†232	...	...	...	...	...	8	11
Teso ...	1	100	78	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	18
TOTAL ...	8	6,575	1,325	5,075	265	391	5	26	...	278	...	...	...	...	232	...	...	...	...	...	68	29
NORTHERN :—																						
Masindi ...	19	15,090	2,276	12,369	208	1,401	...	15	...	73	...	..	...	10	‡384	...	35	65	15	150	...	67
Hoima .	1	1,000	450	200	50	300	...	...	...	...	...	...	...	...	100	...	...	...	...	...	...	...
TOTAL ...	20	16,090	2,726	12,569	258	1,701	...	15	...	73	...	...	...	10	484	...	35	65	15	150	...	67
WESTERN :—																						
Toro ...	19	10,837	1,199	9,208	158	920	..	...	..	...	...	...	...	...	33	...	...	...	...	...	...	48
GRAND TOTAL ...	128	74,934	19,690	52,365	1,072	8,186	65	173	484	3,457	117	1,048	...	777	3,259	248	98	65	15	150	68	349

* Of these 585 acres are under shade. † Of these 17 acres are under shade. ‡ Of these 119 acres are under shade.

N.B.—The above figures are compiled from returns actually sent in. Many plantations sent in no figures this year.

Appendix 3—*continued.*

Mission Agriculture.

PROVINCE.	Coffee *Arabica.*	Coffee *Robusta.*	Para Rubber.	Other Rubbers.	Cacao.
	Acres.				
BUGANDA	621	26	169	115	117
EASTERN	52	...	...	5	20
NORTHERN	91	...	...	1	...
WESTERN	24	...	...	...	...
TOTAL ...	788	26	169	121	137

Appendix 4.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Coca Leaves from Uganda.

Description of Samples.

The samples were as follows:—

(1) "SUN-DRIED." Weight about 1 oz.

Dry, brittle leaves, ranging in colour from pale yellowish-green to pale green. Some broken leaves were present, but on the whole the sample was in good condition.

(2) "DRIED UNDER SHADE." Weight about ¾ oz.

Dry, brittle leaves, of an olive-green colour. The sample was practically free from broken leaves.

Results of Examination.

The samples were examined with the following results:—

	Sample No. 1. *per cent.*	Sample No. 2. *per cent.*
Moisture	7·5	7·2
Total alkaloid, in material as received ...	1·045	0·945
Total alkaloid, expressed on dry material ...	1·13	1·02

In both cases the alkaloid was obtained in a crystalline condition, indicating that it consisted chiefly of cocaine.

Commercial Valuation.

The two samples were submitted to brokers in London, who stated that their nominal value would be about 6d. and 9d. per lb. respectively (November, 1916), the higher valuation of sample 2 being due to the better colour and unbroken condition of the leaves. The firm added that as the source of supply is new only nominal valuations could be given, and they recommended that a trial shipment should be forwarded from Uganda in order to test the market.

Remarks and Conclusions.

The results of the examination show that both samples contained satisfactorily high percentages of total alkaloid. The chief alkaloidal constituent of the samples was cocaine, and in this respect they were similar to South American and Ceylon coca leaves. They are therefore suitable for coca preparations, as well as for the production of cocaine.

The difference in the mode of drying the two samples had produced a marked difference in the colour of the dried leaves, and this is of importance, as coca leaves are sold on the London market more by their appearance than by the percentage of alkaloid they contain. In the present case, for example, the sun-dried leaves, which contained rather more alkaloid than the shade-dried sample, were valued at a lower figure.

11th December, 1916.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Tobacco from Uganda.

Description of Samples.

(1) "FROM VIRGINIA SEED LOCALLY GROWN. SUN-CURED AND SLIGHTLY FERMENTED." Weight 3 oz.

Ten leaves, which were of fairly uniform size, measuring about 18 inches in length and 9½ inches in width. They were of a medium reddish-brown colour, of thin, fine texture and on the whole fairly strong; some leaves, however, were inclined to be papery and weak. Several of the leaves were rather broken but the others were in good condition.

(2) "FROM VIRGINIA SEED LOCALLY GROWN, THE SAME AS SAMPLE 1. SUN-CURED AND SLIGHTLY FERMENTED." Weight 2¾ oz.

It was stated that this tobacco was never taken out of the nursery, but was cultivated there.

Eighteen small leaves mostly measuring from 14 to 16 inches in length and from 6 to 7 inches in width (a few measuring 17 by 8 inches), and varying in colour from light to medium reddish-brown. The leaves were thin, of fine texture, and on the whole fairly strong, but some were weak in places. There were also present a few fairly thick leaves, varying from medium to dark reddish-brown in colour.

The sample on the whole was of poor appearance, most of the leaves being spotted or discoloured and several torn.

(3) "TURKISH TOBACCO FROM IMPORTED SEED. AIR-CURED UNDER VERANDAH, BULKED, AND FERMENTED SLIGHTLY."

Nineteen small leaves, measuring from about 9 to 11 inches in length and from 4 to 5 inches in width, of a medium reddish-brown colour, with an occasional greenish or orange tint. The leaves were thin and of fine texture, but on the whole were lacking in strength. Several leaves were rather torn and a few slightly spotted, but otherwise the sample was in good condition.

Results of Examination.

The samples were so small that only a preliminary examination could be made.

Chemical Analysis.—For this purpose representative portions of samples 1 and 2 were mixed together and submitted to chemical examination with the following results, which are calculated for leaves containing 14 per cent of moisture:—

		per cent.
Moisture	...	14·0
Nicotine	...	1·9
Nitrogen	...	2·7
Ash	...	18·7
The ash contained:—		
Lime	CaO ...	26·0
Magnesia	MgO ...	9·4
Potash	K_2O ...	34·6
Soda	Na_2O ...	3·1
Sulphates, expressed as sulphuric acid	SO_3 ...	3·0
Chlorides, expressed as chlorine	Cl ...	1·9

The above results indicate that the leaf is of satisfactory composition, containing a low percentage of nitrogen and nicotine and a large proportion of potash.

Sample No. 3 was too small for chemical examination, and none of the samples were large enough for commercial valuation.

Smoking Trials.—The samples were subjected to burning and smoking tests with the following results:—

No. 1.—In cigarette form this tobacco burnt easily and held fire well, yielding a grey ash. The smoke was pungent.

No. 2.—This tobacco burnt easily and held fire well, leaving a grey ash. The smoke had a moderately pungent flavour, quite similar to that of sample 1, but somewhat milder.

No. 3.—This tobacco burnt well and held fire well, yielding a whitish-grey ash. It had a pleasant, sweetish, mild flavour, but entirely lacked the aroma characteristic of the smoke from "Turkish" tobacco.

Remarks.

As pointed out already these samples were too small to permit of detailed examination and commercial valuation. For this purpose samples weighing at least 1 lb. each should be sent. The results now obtained show, however, that the soil in which these tobaccos were grown is quite suitable for this crop, as it produces leaves containing a large proportion of potash, which therefore burn well, and which are not excessively rich in nitrogen and nicotine and will therefore not be too pungent when they have been properly cured and fermented. For the proper preparation of Virginia tobacco "barn-curing" as described in the "Bulletin of the Imperial Institute" (Vol. viii (1910), p. 177) is essential. Similarly for the preparation of Turkish tobacco the process described in the "Bulletin of the Imperial Institute" (Vol. xi (1913), p. 326) should be followed in order to obtain a product having the characteristic aroma and flavour associated with this type of tobacco.

4th May, 1917.

Comparative Statement of Exports connected with Agriculture.

Articles.	Unit.	Year ended 31st March, 1913.		Year ended 31st March, 1914.		Year ended 31st March, 1915.		Year ended 31st March, 1916.		Year ended 31st March, 1917.	
		Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£
Coffee Husked	cwts.	3,336	8,940	12,252	23,167	2,103	5,542	8,691	22,714	31,136	81,323
„ in Parchment						18,998	35,462	34,547	64,488	17,473	32,616
Cacao	lbs.	—	—	—	—	—	—	—	—	28,853	562
Chillies	cwts.	10,599	12,408	7,205	8,247	5,116	5,835	8,333	16,850	13,317	27,328
Ground Nuts	„	11,708	5,570	7,671	3,740	156	76	1,693	822	3,640	1,767
Ghee (Clarified Butter)	„	4,737	11,439	4,851	12,507	4,693	12,264	4,591	11,999	7,007	18,310
Jaggree (Unrefined Sugar)	„	319	301	216	193	265	159	551	329	520	310
Simsim Seed	„	31,402	16,812	17,919	10,449	80,514	4,764	39,261	21,986	38,090	21,318
Cotton, Ginned	„	77,728	214,170	85,217	272,366	107,139	320,486	91,231	239,483	77,961	348,880
„ Unginned	„	48,538	40,209	44,130	45,321	30,188	33,660	8,110	5,943	32	34
„ Seed	„	112,283	11,335	134,128	13,499	180,334	18,172	104,498	9,760	109,213	10,220
Beeswax	lbs.	2,352	117	882	42	350	17	42	2	35	2
Hides	cwts.	12,878	45,854	13,837	52,926	38,138	54,917	18,130	63,467	19,070	52,420
Rubber, Wild	lbs.	27,216	3,647	10,416	1,107	—	—	5,538	554	400	40
„ Plantation	„	4,474	834	19,454	2,934	22,056	1,838	52,349	4,362	71,995	5,856
Skins (Goat)	No.	573,852	28,543	464,987	29,037	364,384	19,091	391,290	18,260	398,448	16,095
„ (Sheep)	„	83,989	1,940	59,644	1,615	22,178	506	10,144	169	9,380	126
„ (Calf)	cwts.	847	2,941	1,052	4,204	732	2,710	612	2,227	127	345
Miscellaneous	No.	—	7,994	—	582	—	558	—	261	—	443
Cotton Seed Oil	cwts.	583	716	—	—	21	25	725	870	—	—
Simsim Oil	„	7	12	36	71	3	6	134	250	387	725
Donkeys	No.	2	4	—	—	13	17	125	334	47	119
Cattle	„	1,516	6,205	246	1,006	266	789	836	3,025	1,625	5,909
Miscellaneous Live-Stock	„	632	428	—	—	—	—	—	—	193	103
Miscellaneous	„	—	3,333	—	3,792	12	12	14	1	—	—
Grand Total			£423,752		£486,223		£516,907		£488,156		£624,851